

The advantages of polymeric hydrogels in calcineurin inhibitor delivery

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Abstract

In recent years, polymeric hydrogels (PolyHy) have been extensively explored for their applications in biomedicine as biosensors, in tissue engineering, diagnostic processes, and drug release. The physical and chemical properties of PolyHy indicate their potential use in regulating drug delivery. Calcineurin inhibitors, particularly cyclosporine (CsA) and tacrolimus (TAC), are two important immunosuppressor drugs prescribed upon solid organ transplants. Although these drugs have been used since the 1970s to significantly increase the survival of transplanted organs, there are concerns regarding their undesirable side effects, primarily due to their highly variable concentrations. In fact, calcineurin inhibitors lead to acute and chronic toxicities that primarily cause adverse effects such as hypertension and nephrotoxicity. It is suggested from the evidence that the encapsulation of calcineurin inhibitors into PolyHy based on polysaccharides, specifically alginate (Alg), offers effective drug delivery with a stable immunosuppressive response at the in vitro and in vivo levels. This not only may reduce the adverse effects but also would improve the adherence of the patients by the effective preservation of drug concentrations in the therapeutic ranges.

Author keywords

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