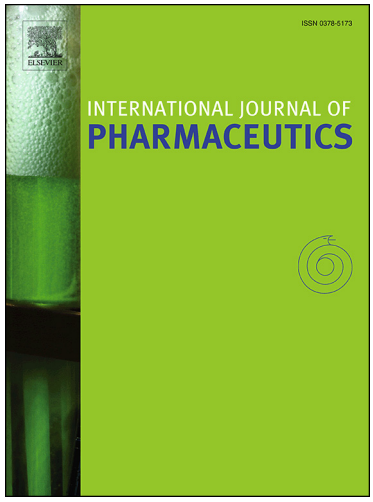

A stimuli-responsive insulin delivery system based on reversible phenylboronate modified cyclodextrin with glucose triggered host-guest interaction

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A stimuli-responsive insulin delivery system based on reversible phenylboronate modified cyclodextrin with glucose triggered host-guest interaction

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Abstract

Injection of insulin is an effective therapy to treat most patients with the type I diabetes and some with type II diabetes. Additionally, the release of insulin under specific conditions has attracted widespread interest. In this study, a smart drug carrier that can release insulin depending on the changes in blood glucose levels was designed. Combining two popular molecules through facile synthetic processes, a drug carrier of reversible phenylboronate group modified cyclodextrin (β-CD-EPDME) was fabricated. The drug carrier is composed of cyclodextrin, which can encapsulate insulin, and phenylboronate, which is sensitive to the *cis*-diols in some saccharides. Moreover, β-CD-EPDME can successfully encapsulate insulin and almost completely release insulin in the presence of glucose. The detached phenylboronic acid moiety triggered by glucose can attack the β-CD cavity and form a host-guest complex, which can force out the encapsulated insulin within the cavity. In addition, the insulin released from the β-CD-EPDME@Insulin complex retains its secondary structure, and the drug carrier has been proven to have low cytotoxicity. Thus, this safe and glucose-responsive drug carrier shows the potential for use in the therapy of diabetes.

Keywords: insulin, diabetics mellitus, glucose-sensitive, cyclodextrin, phenylboronic acid.