Pharmaceutical Technology
Perspectives

Editor
Muhammad Taher

IIUM Press
Table of Content

1. Small Active Molecules with Insulin Mimetic Activity  
   Muhammad Taher  

2. Liver and Kidney Protective Effects of the Polyphenols, Tocopherols and Carotenoids  
   Juliana bt Md. Jaffri  

3. Potential Surface Active Properties of *Nigella sativa*  
   Siti Nurfa Jarvisah bt Said and Kausar bt Ahmad  

4. Pufa in Fish: Extraction and Fractionation Methods  
   Sahena Ferdosh and Md. Zaidul Islam Sarker  

5. Polypyrrole-Peg Composite Film for Drug Delivery  
   Khadijah bt Edweng  

6. Co-Encapsulation of Cyclophosphamide and Mesna into Double-Walled Microspheres  
   Farahidah bt Mohamed and Christopher van der Wallle  

7. A Recent Updates of Polysaccharide Based Nanoparticulate Oral Preparation of Insulin with Special Emphasis on *In Vivo* Application  
   Uttam Kumar Mandal  

8. Development of an Appropriate and Robust Dissolution Method for Solid Dosage Forms  
   Uttam Kumar Mandal  

9. Use of Cyclodextrin in the Production of Biomedical Nano Particles  
   Omar El-Hadad  

10. The Role of Pharmacogenetic Variation in Metoprolol CYP2D6 Genotypes Polymorphism  
    Wan Mohd Azizi Wan Sulaiman, Tariq Abdul Razak, Lay Kek Teh and Rusli Ismail  

11. Polymorphic Crystals and Their Characterisation  
    Mohd Rushdi Abu Bakar, Zoltan Kalman Nagy and Christopher David Rielly  

   12  
   25  
   37  
   51  
   64  
   77  
   97  
   116  
   126  
   133  
   163
CHAPTER 7

A RECENT UPDATES OF POLYSACCHARIDE BASED
NANOPARTICULATE ORAL PREPARATION OF INSULIN WITH
SPECIAL EMPHASIS ON IN VIVO APPLICATION

Uttam Kumar Mandal
Department of Pharmaceutical Technology, Kulliyyah of Pharmacy, IIUM, Kuantan, Malaysia

In the 21st century, diabetes has appeared as curse to human civilization. According to a recent WHO report, approximately 346 million people worldwide are suffering from this deadly disease. A large number of diabetic patients require subcutaneous daily doses of insulin which is painful and associated with many other complications. For obvious reason of patient compliance with existing therapy, the search for alternative simple, noninvasive and patient friendly delivery modes are being explored by scientists all over the world. So far, polysaccharides like chitosan, alginites, and pectin based insulin nanoparticles have produced limited but encouraging in vivo results for oral delivery of insulin. The present review article deals with polysaccharide based oral nanoparticulate formulations of insulin and their in vivo success storey.

7.1 Introduction

Diabetes is one of the major causes of premature illness and death worldwide. It is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body can’t effectively use the insulin it produces. Insulin is a peptide hormone which mainly regulates blood sugar. It is composed of 51 amino acids that is synthesized, packaged, and secreted in pancreatic beta cells. Hyperglycemia or increased blood sugar is a common effect of uncontrolled diabetes and over time it leads to serious damage to many of the body's