UNIVERSITI TEKNOLOGI MARA

PLGA NANOPARTICLES FOR SUSTAINED RELEASE USING SUCROSE ESTER AS AN ALTERNATIVE SURFACTANT

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Dissertion submitted in partial fulfilment of the requirements for the

Faculty of Pharmacy

October 2009

ACKNOWLEDGEMENT

I would like to express my gratitude to all those who gave me the possibility to complete this thesis. This study cannot be completed without the help of many individuals. With the full responsibilities and co-operation, I worked hard in order to accomplish this research that has been given to me.

Most of all, all great abundance thanks to the Glorious Almighty Allah, the Omniscient and the sole nourish the sustainer of the universe, who gave me strength, taught me and guided my step in completing this research.

I wish to pay my profound gratitude to my supervisor Dr Javad Khadem Sameni for his supervision and countless support, whose help me conducting this research, stimulating suggestions and encouragement that willing to help me in all the time of research and in writing of this thesis. The preparation of this thesis would never have been possible without his constructive suggestions, continual encouragement and assistance.

Moreover, I want to thank the Faculty Pharmacy UiTM for giving me the oppurtunity to commence this thesis in the first instance, which allowed me to gain experiences as a researcher with the establishment of this subject. Thank you to the dean and all the lecturers for giving a stimulating support.

My profound appreciation is extended to my all of friends, well wishers, closed once and research assistants in the laboratories where I did my lab work. I want to thank them for all their help, support, interest and valuable hints.

Finally, I would like to express high gratitude to my family for their continued encouragement and support. I felt blessed and strengthened by their unconditional support and love.

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ABSTRACT

Sucrose esters (SE) are surfactants with potential pharmaceutical application as it has low toxicity, excellent biocompatibility and biodegradibilty. The objective of the study is to investigate SE as alternative surfactants in stabilizing emulsions for the preparation of drug-loaded nanoparticles. To achieve this goal, using ibuprofen as drug carrier and 50:50 poly(d,lactide-co-glycolide) as polymer carrier, the study investigated first the influence of the following variables on blank nanoparticle characteristics: (1) hydrophile-lipophile balance (HLB) of SE palmitate, (2) homogenizing speed and (3) homogenizing time. Results showed that particles characteristic were at best when using HLB 15 of SE at homogenizing speed and time (#1, 60 seconds). The later ibuprofen-loaded nanoparticles made using this optimal parameters revealed a relatively acceptable encapsulation efficiency more than 50%. In term of dug release, there was high initial burst release followed by the more constant release thereafter. This study may suggest that many options can be done in order to optimize the stability, particles characteristics of the nanoparticles as well as drug content and encapsulation efficiency which may be helpful in the development of nanoparticle system for parenteral delivery of drug, protein and gene medicine, by using SE as an alternative surfactant.

CHAPTER ONE

INTRODUCTION

1.1 Background study

Development of novel drug molecule is expensive and time consuming. Improving safety efficacy ratio of the "old" drugs has been attempted using diverse methods such as individualizing drug therapy and therapeutic drug monitoring. Delivering drug at controlled rate, slow delivery, and targeted delivery are other very attractive methods and have been pursued very vigorously (Sam *et. al.* 2008).

Nanospheres and microspheres have been broadly used to deliver a wide range of drugs as they can protect the drug from metabolizing enzymes, sustain the release, be administered orally or injected locally, and target specific tissues by incorporating surface ligand moieties. A common polymer used in the formulation of nanospheres and microspheres is the biodegradable, biocompatible polymer, poly-lactic-co-glycolic acid (PLGA) (De *et. al.* 2004).

PLGA microparticles have proved to be flourishing drug-delivery systems for incorporating different classes of drugs, such as NSAIDs, peptide like LHRH agonists and steroid hormones (M. Tuncay *et. al.* 2000).