

**SUSTAINED RELEASE OF DRUG FROM CHITOSAN
AND SILK FIBROIN BLEND FILMS**



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ABSTRACT

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Keywords : Chitosan, Silk fibroin, Blend film, Degree of swelling, Theophylline, Salicylic acid, Diclofenac sodium, Amoxicillin trihydrate, Drug release, Kinetic

Chitosan/silk fibroin blend films were prepared by solution casting using glutaraldehyde as crosslinking agent. Drug release properties of chitosan and blend films of various blend compositions were investigated *in vitro* using a modified Franz Diffusion Cell at 37°C and pH 5.5. Pig skin was used as material representing human skin. Theophylline, salicylic acid, diclofenac sodium and amoxicillin trihydrate were used as model drugs. The order of drugs from the highest release to the lowest release was as follows: salicylic acid > theophylline > diclofenac sodium > amoxicillin trihydrate. For all model drugs, the blend films with 80% chitosan gave the maximum drug release. In addition, an increase in thickness of the films resulted in a decrease in the amount of drug released. All model drug release data could be fitted to either zero order or Higuchi's model indicating that the releases of model drugs from chitosan and the blend films were either rate-controlling or diffusion-controlled releases. It was expected that the chitosan/silk fibroin blend films could be used as matrix for sustained release of a drug for a transdermal drug delivery system.

บทคัดย่อ

สุพัตรา ลิ้มปัทม : การศึกษาการปลดปล่อยของยาจากฟิล์มของพอลิเมอร์ผสมระหว่างไคโตซานและซิลค์ไฟโบรอิน (Sustained Release of Drug from Chitosan/Silk Fibroin Blend Films) อ. ที่ปรึกษา : ผู้ช่วยศาสตราจารย์ รัตนา รุจิระวานิช และ ศาสตราจารย์ อเล็กซานเดอร์ เอ็ม เจมิสัน 96 หน้า ISBN 974-17-2341-5

งานวิจัยนี้ศึกษาการเตรียมฟิล์มระหว่างไคโตซานและซิลค์ไฟโบรอินแล้วผสมด้วยยาในอัตราส่วนของไคโตซานและซิลค์ไฟโบรอินต่างๆ โดยเปรียบเทียบปริมาณยาที่ถูกปลดปล่อยออกจากแผ่นฟิล์มในระบบอินวิโทร ซึ่งใช้หนังหมูเป็นแบบจำลองแทนผิวหนังมนุษย์และใช้ทีโอไฟลีน, ซาลิกไซลิกเอซิด, ไคโครฟีแนคโซเดียมและแอมมอกซีซิคลิน ไตรไฮเดรตเป็นตัวอย่างยาในการทดลอง ในงานวิจัยนี้ใช้กลูตารัลดีไฮด์เป็นสารก่อการเชื่อมในพอลิเมอร์ผสมระหว่างไคโตซานและซิลค์ไฟโบรอิน จากผลการวิจัย พบว่า ลำดับปริมาณการปลดปล่อยของยาจากปริมาณมากไปยังปริมาณน้อยเป็นดังนี้ ซาลิกไซลิกเอซิด, ทีโอไฟลีน, ไคโครฟีแนคโซเดียมและแอมมอกซีซิคลิน ไตรไฮเดรต ซึ่งการปริมาณการปลดปล่อยสูงสุดของยาทุกชนิดพบที่พอลิเมอร์ผสมที่มีไคโตซาน 80 เปอร์เซ็นต์ นอกจากนี้ การใช้ฟิล์มที่มีความหนามากขึ้นส่งผลให้ปริมาณยาที่ปลดปล่อยออกมาน้อยลง ในด้านจลนพลศาสตร์ พบว่า แผ่นฟิล์มผสมระหว่างไคโตซานและซิลค์ไฟโบรอินสามารถควบคุมการปลดปล่อยของยาได้โดยการควบคุมอัตราการปลดปล่อยหรือควบคุมโดยการแพร่ ดังนั้น แผ่นฟิล์มผสมระหว่างไคโตซานและซิลค์ไฟโบรอินสามารถใช้ประโยชน์ในด้านการให้ยาผ่านทางผิวหนังแก่ผู้ป่วยได้

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