Spray coating of microcontainers with eudragit using ferromagnetic shadow masks for controlled oral release of poorly water soluble drugs.

Nielsen, Line Hagner; Keller, Stephan Sylvest; Boisen, Anja; Müllertz, Anette

Published in:
Proceedings of the 2013 AAPS Annual Meeting

Publication date:
2013

Spray coating of microcontainers with eudragit using ferromagnetic shadow masks for controlled oral release of poorly water soluble drugs

Line Hagner Nielsen[1], Stephan Sylvest Keller[2], Anja Boisen[2], Anette Müllertz[1,3]
[1]Department of Pharmacy, Faculty of Health and Medical Sciences University of Copenhagen, Copenhagen Denmark
[2]Department of Micro- and Nanotechnology, Technical University of Denmark, Kgs. Lyngby, Denmark
[3] Bioneer:FARMA, Department of Pharmacy, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark

PURPOSE: To form a lid of Eudragit S-100 or L-100 on the cavity of drug-filled microcontainers (micro scale oral drug delivery devices) by utilizing ferromagnetic masks. Furthermore, investigations of drug release in biorelevant gastric and intestinal media were evaluated for testing the ability of controlling the drug release of poorly soluble drugs from the microcontainers.
METHODS: Cylindrical microcontainers (inner diameter of 240 µm) were fabricated in SU-8, using photolithography on silicon substrate. The microcontainers were filled with either cinnarizine (weak base) or amorphous furosemide salt (weak acid). The cavity of the drug-filled microcontainers were spray coated with a 2 wt% solution of either Eudragit S-100 (soluble below pH 5) or Eudragit L-100 (soluble above pH 6) in isopropanol. The spray coating process was performed using ferromagnetic shadow masks (380 µm) allowing for magnetic clamping to the substrate and therefore precise deposition of the polymer on the microcontainers to form a lid. The release of cinnarizine and amorphous furosemide salt from the coated microcontainers was performed in fasted biorelevant gastric (pH 1.6) and intestinal media (pH 6.5), respectively.
RESULTS: By use of the ferromagnetic shadow masks it was possible to deposit the Eudragit precisely and therefore possible to form a lid of the cavity of the microcontainers. The thickness of the Eudragit layer on the cavity of the microcontainers was approximately 8-10 µm for both types of Eudragit. It was possible to control the drug release of cinnarizine by using Eudragit L-100 in the gastric medium and also possible to control the release of amorphous furosemide salt by the Eudragit E-100 coating in the intestinal medium.
CONCLUSIONS: The ferromagnetic shadow masks made it possible to deposit a lid of Eudragit on the cavity of the microcontainers and this is important in terms of utilizing the microcontainers as an oral drug delivery system as the drug release can be controlled.