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Microcontainers improve oral bioavailability of furosemide

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Introduction

For oral drug administration, it can be necessary to introduce drug delivery systems to facilitate an improvement in bioavailability. Micro fabricated devices have been proposed as promising oral drug delivery systems[1]. Microcontainers are polymeric, cylindrical devices in the micrometer size range. They allow for unidirectional release, and the drug can be protected inside the cavity of the microcontainer until release is desirable[2].

Aim

The purpose of this study was to investigate interactions between the microcontainers and the small intestine *in situ* and furthermore, to evaluate the oral *in vivo* performance in rats of the microcontainers filled with amorphous sodium salt of furosemide (ASSF).

Method

Microcontainers (diameter of 223 µm) were fabricated in SU-8 (Fig 1a). The microcontainers were filled with ASSF, and the cavity was spray coated with Eudragit L100 or chitosan. *In situ* intestinal perfusions were performed in rats[3]. The microcontainers were dosed to the small intestine, and at the end of the study, the small intestine was harvested from the rat and imaged under microscope. For the *in vivo* studies, the rats were dosed orally with capsules containing drug-filled microcontainers coated with Eudragit L100. As control, capsules were filled with the powder of ASSF and the capsules were coated with Eudragit L100.

Results

The microscope images of the small intestine after the perfusion studies showed that the microcontainers interacted with the mucus in the small intestine, and the microcontainers were engulfed by the intestinal mucus (Fig 1b). The oral bioavailability study showed that the relative oral bioavailability of ASSF in microcontainers was found to be 220±43% when comparing to drug-filled capsules coated with Eudragit (Fig 1c).

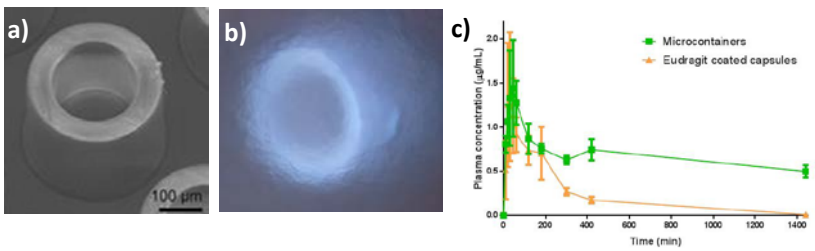

Fig 1 *a) SU-8 microcontainer with a diameter of 223 µm. b) Microcontainer in intestinal mucus following in situ intestinal perfusion. c) Plasma concentrations of microcontainers filled with ASSF coated with Eudragit L100 and filled into capsules and ASSF dosed in capsules with Eudragit coating after orally dosing to rats*

Conclusion

Microcontainers show considerable potential as a future oral drug delivery system.

References

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