In-Situ Forming Implant: Impact of PLGA-Grade and Drug Load on the Drug Release and PLGA Degradation

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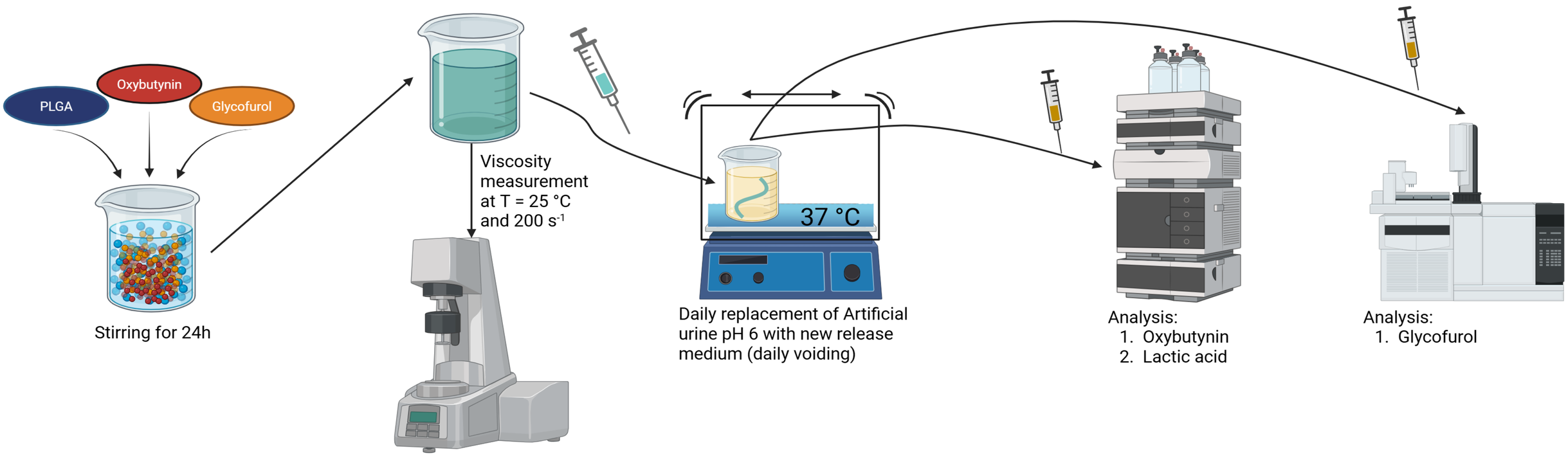
Introduction

The urinary bladder is a site of administration with different challenges. Formulation candidates for neurogenic detrusor overactivity (NDO) face urine, which is a difficult release medium due to voiding of the medication via the urine after different time intervals [1]. Current medications have either high systemic side effects (oral) or are being voided (intravesical). Therefore, the aim was to investigate locally administered in-situ forming implants (ISFI) with different PLGA-grades and drug load for the treatment of NDO [2].

Methods



Results

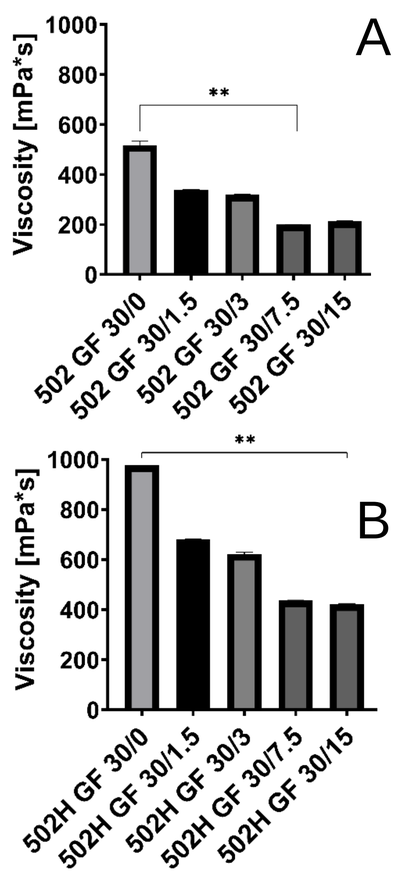


Figure 1: Viscosity of ISFI-solutions with different drug loads and compared with a solution without API.

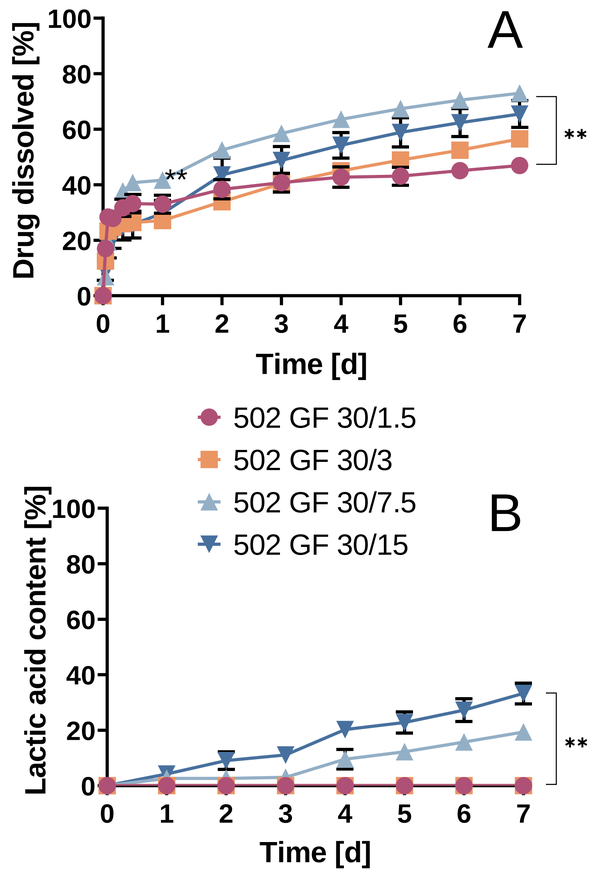


Figure 2: Oxybutynin released for different ISFI for 7 days (A). Degradation of the PLGA in ISFIs, characterized by the measured lactic acid content in the release medium for different implants (B).

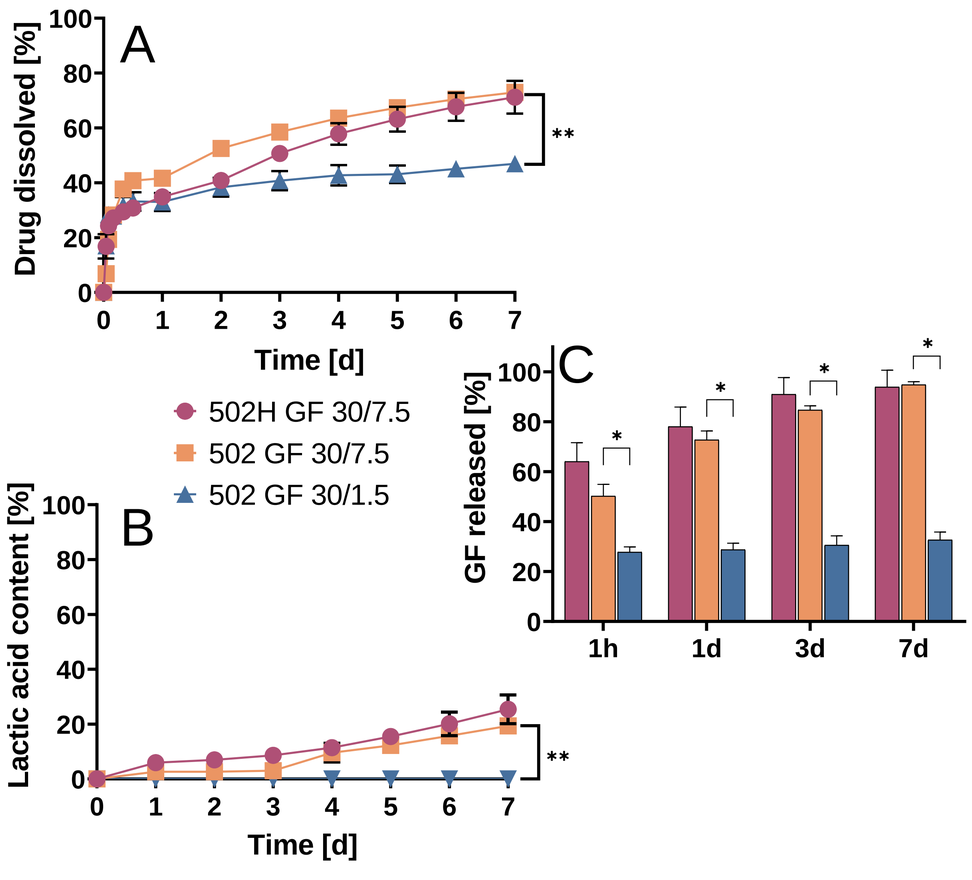


Figure 3: Oxybutynin released for different ISFI in artificial urine at pH 6 for 7 days (A). Degradation of the PLGA in ISFIs, characterized by the measured lactic acid content in the release medium for different implants (B). Solvent released for these ISFI (C).

Conclusion

ISFI can significantly reduce the number of bladder administrations for treating NDO. It could be shown, that factors like drug loading, PLGA composition and viscosity influence the initial and final release of oxybutynin and glycofurol in addition to the possibility of modifying the degradation of implants by altering the drug load or end group of PLGA.

References

[1] R. Siener, „The Effect of Different Diets on Urine Composition and the Risk of Calcium Oxalate Crystallisation in Healthy Subjects“, European Urology, Bd. 42, Nr. 3, S. 289–296, Sep. 2002.
[2] I. C. Young u. a., „Dose-Ranging Plasma and Genital Tissue Pharmacokinetics and Biodegradation of Ultra-Long-Acting Cabotegravir In Situ Forming Implant“, Pharmaceutics, Bd. 15, Nr. 5, S. 1487, Mai 2023.

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