

DEVELOPMENT OF BIODEGRADABLE SELF-ROLLED PATCHES FOR DRUG RELEASE

Sidziqui OUEDRAOGO¹, Mathilde GROSJEAN², Arnaud PONCHE¹, Laurent PIEUCHOT¹, Valeriy LUCHNIKOV¹, Noëlle MATHIEU³, Benjamin NOTTELET², Karine ANSELME¹

¹ UMR 7361/UHA, Institut de Science des Matériaux de Mulhouse (Biomatériaux-Bio-interfaces), Mulhouse, France ;

² UMR 5247, Institut des Biomolécules Max Mousseron (Polymères pour la santé et les biomatériaux), Montpellier, France ;

³ Institut de Radioprotection et de Sécurité Nucléaire (Laboratoire de radiologie des expositions médicales), Paris, France

Sidziqui.ouedraogo@uha.fr

A specific innovative treatment is needed to address the Pelvic Radiation Disease (PRD) ^{1,2}. Current treatments are symptomatic and not curative while some, like systematic drugs, induce systematic side effects. To achieve an efficient therapeutic solution and minimize systemic toxicity, a specific local treatment targeting the inflamed mucosa areas is proposed. We develop a biodegradable self-rolled patch that could be applied locally by colonoscopy without surgery. This innovative biomaterial is based on the combination of biodegradable hydrogel and elastomeric layers (Fig. 1A). The association of two different layers confers tunable mechanical and bio-resorption properties to the patch and allows the unidirectional release of anti-inflammatory drugs (AI) such as Budesonide and Prednisolone toward the ulcerated zone after its unrolling. Here we report the patch building methodology and his characterization. The similar nature of the two layers leads to a good cohesion and the formation a regular stable patch (Fig. 1B). The bilayer films are able to enroll (Fig. 1C) and achieve our final requirements (Fig. 1D). Ongoing work focuses on the optimization of amount of drug released and the patch self-unrolling to facilitate his deployment after the placement in the colon *in vivo*.

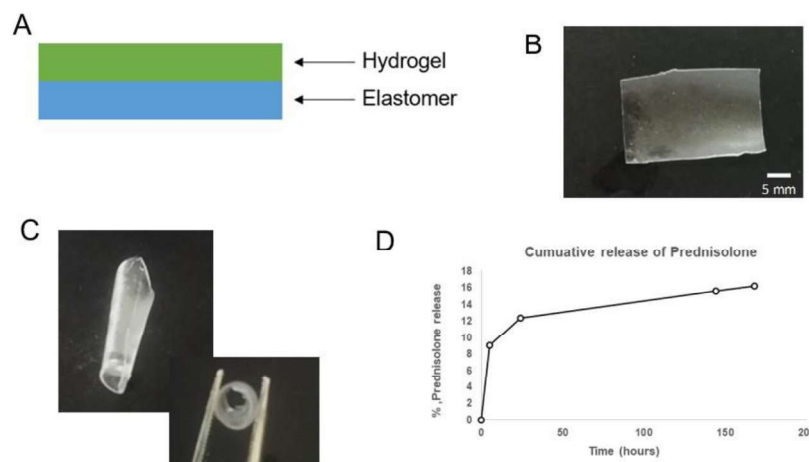


Figure 1: A- Schematic illustration of bilayer patch structure model. B- Synthesized drug delivery system (30 mm × 15 mm × 0.16 mm), C-PEG-PLA bilayer self-rolled tube 4 mm diameter. D- Cumulative release of Prednisolone from synthesized hydrogel layer

References

1. Andreyev, H. J. N., Wotherspoon, A., Denham, J. W. & Hauer-Jensen, M. 'Scandinavian Journal of Gastroenterology' vol. 46 389–397 (2011).
2. Moussa, L. *et al. Biomaterials* **115**, 40–52 (2017).