Technology Opportunity, Ref. No. UB-21/402

Effective local treatment of inflammatory bowel disease

A temperature-triggered in situ forming gel (TIF-Gel) for topical treatment of ulcerative colitis has been developed. TIF-Gel, a low-viscosity precursor at room temperature, provides excellent applicability per enema and transforms into a high-viscosity material at rectal temperature, granting high retention time and sustained drug release.

Keywords Drug delivery, lipid mesophase, gel, sustained release, inflammatory bowel disease, (ulcerative) colitis, topical application

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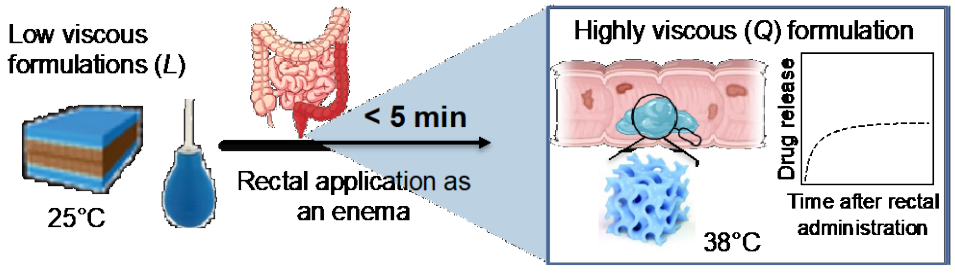
Background Lipid mesophases (LMPs) are a biocompatible and versatile drug delivery system formed by lipids (generally recognized as safe for human use by the FDA) in aqueous solutions that allow incorporation and release of molecules with different polarities and sizes. The nature of the lipid, water content and temperature influence the lipid arrangements, which range from the less viscous lamellar to the more structured (and viscoelastic) cubic phase. Although the latter has optimal rheology to act as a drug depot for a broad range of applications, its high viscosity makes the administration challenging. Water can overcome this challenge by triggering the *in situ* formation of gelled cubic structures, starting from a less viscous ethanolic solution containing lipids and drug.

Invention The inventors developed a rectal formulation capitalizing on the biocompatible and biodegradable self-assembled structure of LMPs, where **temperature** was selected as a gelation trigger instead of water as the gel's volume and composition in the rectum is affected by physiological and pathological conditions. This versatile TIF-Gel platform can host and release drugs of different polarities in a sustained manner. TIF-Gel was shown to adhere to the colonic wall for 6 h, preventing leakage and improving drug bioavailability in an ulcerative colitis animal model. It was tested in vivo using two different murine models of intestinal inflammation, proving that the administration of the drugs in the gel was superior in reducing intestinal inflammation than the application of a solution containing the drug.



Application Thanks to the slow release of APIs and their negligible systemic absorption, the strong adherence to the mucosal wall and patient-friendly administration, such a delivery strategy will help in decreasing adverse effects associated with the systemic application of treatments not only for intestinal conditions but also for women's health.

Patent Status International Patent Application PCT/EP2023/076606

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