In Situ Deposition of Hydrogels for Treatment of Inflammatory Bowel Disease*

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Inflammatory bowel disease (IBD), most notably Crohn's disease and ulcerative colitis, currently afflicts 1.4 million people in the United States alone and leads to chronic inflammation of all or part of the digestive tract and damage to the intestinal lining. Current treatment plans focus on systemic or intestinal delivery of drugs to either suppress the immune system or interrupt inflammatory pathways; however these drugs frequently fail or are inadequate to prevent or reverse the damage. Over the long term, 75% of Crohn's disease and 25% of ulcerative colitis patients will require surgery to remove diseased sections of their bowels [1-5].

The purpose of this study is to develop a new class of colonoscope-based treatment options that specifically target the diseased area and locally deliver drugs and stem cells through sprayable application of a regenerative hydrogel during diagnostic procedures. Thermo-responsive hydrogel solutions can solidify immediately on warm body tissue after spraying and create a homogeneous therapeutic coating on the diseased tissue. The hydrogel's physical properties can be easily manipulated, and the use of spray deposition techniques will enable rapid and minimally-invasive application of homogenous, multilayer, and conformal coatings *in vivo* [6-7]. Ultimately, the regeneration of diseased or damaged sections of the intestinal tract could prevent the need for bowel resection, lead to reduced symptoms, and provide a higher quality of life for patients.

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