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Layer-by-layer coated dexamethasone microcrystals for experimental inflammatory bowel disease therapy**Murtada A Oshi, Nurhasni Hasan and Jin-Wook Yoo**
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Layer-by-layer (LBL) coating has gained popularity for drug delivery of therapeutic drugs. Herein, we described an approach for enhancing the therapeutic efficiency of the locally administered dexamethasone (Dx) for the treatment of inflammatory bowel disease (IBD). We utilized a LBL-coating technique for alternative coating of Dx microcrystals (DxMCs) with multiple layers of polyelectrolytes composed of poly (allylamine hydrochloride), poly (sodium 4-styrene sulfonate) and Eudragit® S100. The successful deposition of the layers onto DxMCs surfaces were confirmed through zeta potential measurement and confocal laser scanning microscopy, while the surface morphology was investigated through scanning electron microscopy. The drug encapsulation efficiency for LBL-DxMCs was 95% with a mean particle size of 2 µm and negative surface charge of -45 mV. Moreover, *in vitro* drug release studies showed a minimum release of the drug (15%) at an acidic condition during initial first 5 h followed by sustained-release at alkaline condition. For *in vivo* study, LBL-DxMCs were administered orally to male ICR mice suffering from dextran sulfate sodium-induced colitis. LBL-DxMCs was found to substantially enhance anti-inflammatory efficacy of the drug compared to uncoated DxMCs. Macroscopic, histological and biochemical (tumor necrosis factor-α, interleukin-6 and myeloperoxidase) examinations revealed marked improvements of colitis signs in the mice treated with LBL-DxMCs compared with those treated with uncoated DxMCs. Overall, the obtained results demonstrate that LBL-DxMCs are an effective and safe colon-targeted delivery system for the treatment of inflammatory bowel disease.

Recent Publications:

1. Murtada A O, Abdelkarim M A and Huyam A M (2013) The effect of sodium starch glycolate concentration on physical effectiveness of chlorpheniramine tablets. *J Pharm Educ Res.* 4 (1): 47-53.
2. Muhammad Naem, Woosong Kim, Jiafu Cao, Yunjin Jung and Jin-Wook Yoo (2014) Enzyme/pH dual sensitive polymeric nanoparticles for targeted drug delivery to the inflamed colon. *Colloids and Surfaces B: Biointerfaces.* 123: 271-278.
3. Murtada A O and Abdelkarim M A (2013) Phytochemical screening and evaluation of *Monechma ciliatum* (black mahlab) seed extracts as antimicrobial agents. *Avicenna J Phytomed.* 3 (2):126-134.
4. Murtada A O (2013) Evaluation of Physical Effectiveness of Three Brands of Diazepam Tablets Available in Sudanese Retail Pharmacies. *Int. J. of Pharm. & Research Sci.* 2 (4): 642-651.
5. Muhammad Naem, Jiafu Cao, Moonjeong Choi, Woo Seong Kim, Hyung Ryong Moon, Bok Luel Lee, Min-Soo Kim, Yunjin Jung and Jin-Wook Yoo (2015) Enhanced therapeutic efficacy of budesonide in experimental colitis with enzyme/pH dual-sensitive polymeric nanoparticles. *Int J Nanomedicine.* 10: 4565-4580.

Biography

Murtada A Oshi is pursuing his PhD at college of Pharmacy, Pusan National University, South Korea majoring in Manufacturing Pharmacy. His study in the field of colon-specific delivery of nano and microscale drug delivery system for the treatment of inflammatory bowel disease: ulcerative colitis and Crohn's disease. He is mainly focusing on solving out the disadvantages of traditional anti-inflammatory drugs, e.g. systemic side effects, poor targetability etc., used for the treatment of inflammatory bowel disease. Now, he is studying the anti-inflammatory activity of different nano and microscale drug delivery systems loaded with of anti-inflammatory drugs for the treatment of inflammatory bowel disease. He evaluates the anti-inflammatory activity of the formulations both *in vitro* and *in vivo*. For *in vivo* study of inflammation, he used experimental animal colitis using different models such as dextran sodium sulfate, dinitrobenzene sulfonic acid and trinitrobenzene sulfonic acid.

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