INTRODUCTION

There is a need for more efficient and non-invasive drug delivery system to target the colon:
- Oral administration
- Colonic delivery

Schematic of the challenges for an ideal drug carrier system:
- Safe
- Smart
- Size
- Shaping

Cross-linked Alginate Nanotubes = Natural Polymer + Nanostructure + AAO template by dipping technique

DEFINITIONS & OBJECTIVE

- [SA] Varying concentration of sodium alginate
- [CaCl$_2$] Varying concentration of calcium chloride
- t$_c$ Cross-linking time between SA & CaCl$_2$

Control fabrication parameters for desirable properties of alginate nanogel based on:
- Strength
- Ionic cross-linking of sodium alginate [SA] with calcium ions [Ca$^{2+}$]
- Size
- Cross-linking time t$_c$ between SA and CaCl$_2$
- Swelling
- Max swelling and degradation of hydrogel > 6 hours to reach the colonic

METHODOLOGY

1. Preparation of AAO templates coated twice with CaCl$_2$

   AAO wall
   Drying at 80°C for 10 minutes
   Coated 2 times
   Etched and sonicated

2. Synthesis of cross-linked sodium alginate (SA) with calcium chloride (CaCl$_2$)

   Ionic interactions of Ca$^{2+}$ in polymanouronate blocks
   Cross-linking
   Polymer
   Calcium
   Egg box junction of Ca$^{2+}$ in polyanionurate blocks

3. Fabrication of cross-linked hydrogel nanotubes

   Dipping time t$_c$
   AAO templates dipped in [Ca$^{2+}$]

RESULT AND DISCUSSION

1. Swelling behavior

   Swelling profile of nanogel in simulated pH-level along the GI tract at:

   pH 1.2, pH 6.8, pH 7.4

   Optimum conditions:

   Optimum swelling % ~ 7000% at time t ~ 4.95 hours and at T=37°C

   Maximum swelling % based on different variables

   Time at maximum swelling = 4.95 hour

REFERENCES


CONCLUSION

- Nanotubes and Nanorods were fabricated by AAO template infiltration
- Nanostructures varied depending on concentration of SA, concentration of Ca$^{2+}$ and crosslinking time t$_c$
- Optimum swelling % ~ 7000% at time t ~ 4.95 hours and at T=37°C
- Future work will focus on controlled gelation rate at the nanolevel and coating of cross-linked alginate nanostructures to delay disintegration

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