Phenolic Acid Analogues as a Potential Drug Formulation for Inflammatory Diseases

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Introduction

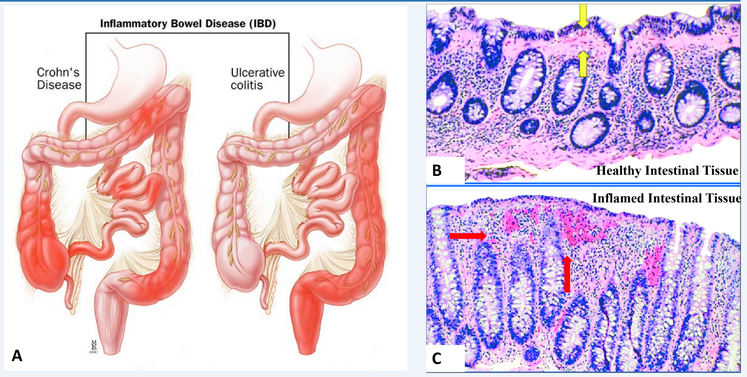


Fig 1. (a) Two main types of IBD. **(b)** Microscopic Mucosal Architecture of the Healthy Intestinal Tissue **(c)** Microscopic Mucosal Architecture distortion of the inflamed tissue mucosal.

In the United States, Inflammatory Bowel Disease (IBD) is the most common reason patients are referred to gasteroenterologists.[1] Due to the multitude of symptoms, patients are often unaware that they suffer this condition. Because of this complexity, IBD is often difficult to diagnose.[2] Symptoms vary from patient to patient and range from:

- **Cramps, Abdominal Pain**
- **Bloating, Diarrhea, Constipation**
- **Altered Gastrointestinal Motility**
- **Visceral Hypersensitivity**
- **Post Infectious Reactivity**
- **Carbohydrate Malabsorption**
- **Intestinal Inflammation**

Statistics of Patients

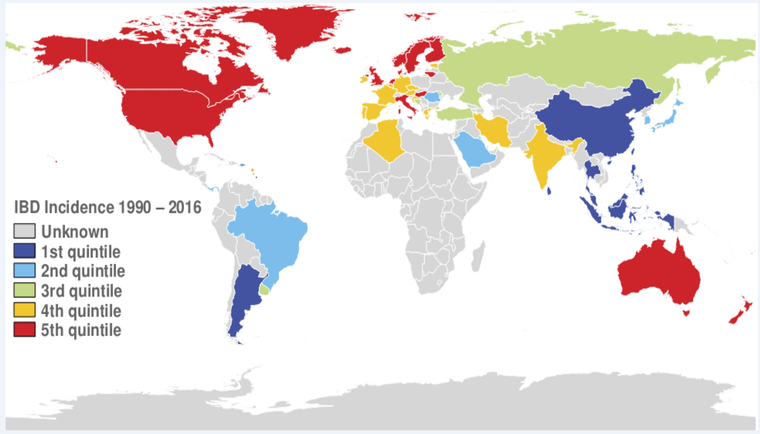


Fig 2. IBD Incidences from 1990-2016 Worldwide.

According to the Center for Disease Control and Prevention, three million adults in the United States are diagnosed with IBD as either Crohn's disease or Ulcerative Colitis.[3] This statistic does not include pediatric patients and has increased a million patients since 1999.[2] Of these patients, most were likely born in the United States, lived in suburban areas or in poverty and are Hispanic or non-Hispanic Caucasians.[3] Furthermore, three times as many women experience IBD due to menstration.[1] Although this disease is prevalent in 15% of primary care cases[1], pathogenesis of the disease is debated and unknown.

Traditional Treatment Disadvantages

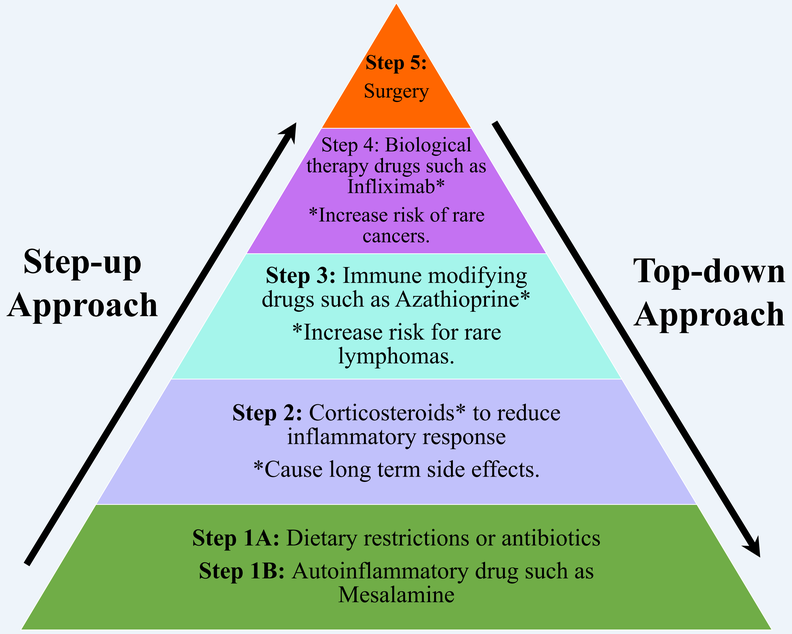
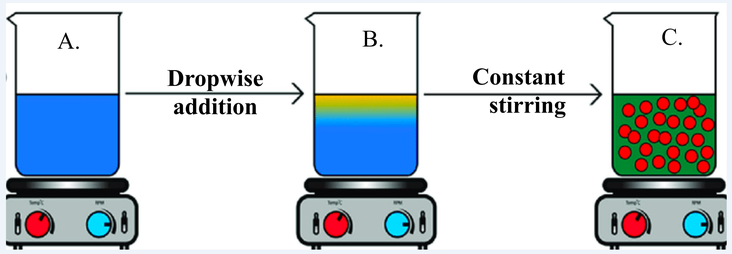


Fig 3. Step-up and top-down approach for patients with uncontrolled IBD.[4]

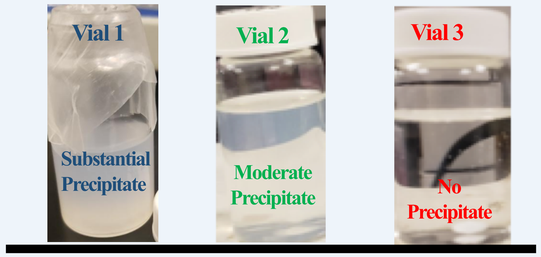
The drug being formulated is a plant based metabolite and less carcinogenic than the medications listed above.

Formulation

The nanoprecipitate method was utilized to form a drug polymer complex.



The drug, polymer and solvent solution was added dropwise into a vial of stabilizer and water under constant stirring.



Scintillation vials were placed in front of a dark background to assess opacity.
Vial 1 contains the drug and PVA as a stabilizer.
Vial 2 contains the drug and P 127 as a stabilizer.
Vial 3 contains the drug and P 127 as a stabilizer.

Experimental Results

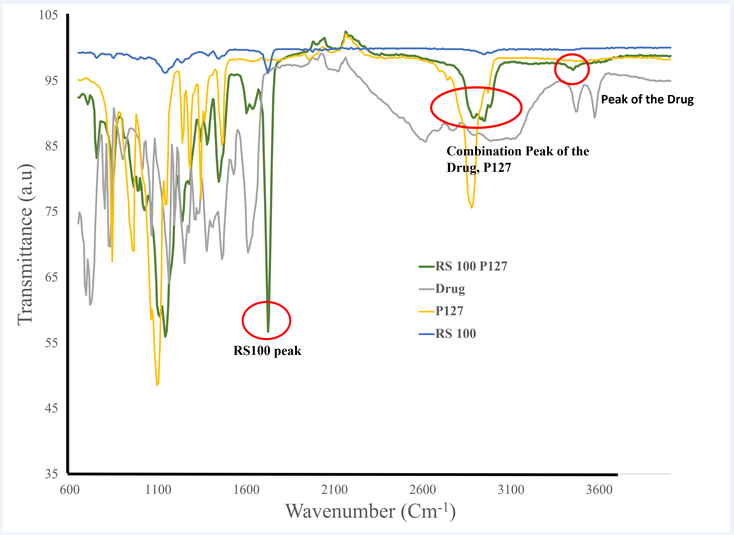


Fig 4. FTIR Analysis of Polymer-Drug Complexes.

Melting Point Ranges	
Drug+ RS 100 + P127	136.4-139.7 °C
Drug + RS 100 + PVA	187.2-188.4 °C
RS 100	161-167 °C

Conclusions

Based on literature, IBD impacts quality of life and does not have a medication regimen that lacks major side effects. Thus, the proposed drug polymer complex drug delivery system aims to reduce the inflammation of intestinal tissue in both Crohn's disease and Ulcerative Colitis. The optimization of the complex with the integration of a stabilizer, polymer, and drug has been demonstrated by nanoprecipitation methodology.

Future Outlook

The future outlook for this project includes the development of a stable drug delivery system and optimizing the drug release from the polymer through the pH dissolution test, drug loading, mice studies, and drug coatings at different pH of gastrointestinal tract for a specified period of time.

References:

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