Treatment of Fungal-Associated Irritable Bowel Disease Using IL-1 Inhibitors

Lead Inventor:

Iliyan D. Iliev, Ph.D.
Associate Professor of Immunology in Medicine,
Weill Cornell Medical College

Business Development Contact:
Brian Kelly
Director, Technology Licensing

(646) 962-7041
bjk44@cornell.edu
# Treatment of Fungal-Associated Irritable Bowel Disease Using IL-1 Inhibitors

## Background & Unmet Need

<table>
<thead>
<tr>
<th>Intestinal fungi play an important role in regulating mucosal immunity as a highly immunoreactive component of the microbiota</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep sequencing-based assays of the gut mycobiome have revealed consistent evidence for “fungal dysbiosis” as a hallmark of inflammatory bowel disease (IBD)</td>
</tr>
<tr>
<td><em>Candida</em> is the most prevalent fungal genus, and its relative abundance is consistently increased in several IBD cohorts based on fecal sequencing</td>
</tr>
<tr>
<td>However, it is currently unknown whether fungi play an essential role in directing mucosal immunity or disease outcomes</td>
</tr>
<tr>
<td><strong>Unmet Need:</strong> Methods to probe the mycobiome at the fungal strain and patient-specific level to inform potential mycobiome-targeted therapies for IBD</td>
</tr>
</tbody>
</table>

## Technology Overview

<table>
<thead>
<tr>
<th><strong>The Technology:</strong> Method to identify and treat IBD patients harboring specific <em>C. albicans</em> strains with IL-1 inhibitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using a proprietary platform that combines high-resolution sequencing, culturing, genomics, and in vitro and in vivo models, the inventors identified opportunistic <em>C. albicans</em> strains that dominate the colonic mucosa of ulcerative colitis (UC) patients</td>
</tr>
<tr>
<td><strong>The Discovery:</strong> <em>C. albicans</em> strains that secrete the toxin candidalysin drive intestinal inflammation through an IL-1β dependent manner</td>
</tr>
<tr>
<td><strong>PoC Data:</strong> IL-1R blockade using an anti-IL-1R antibody dramatically reduced neutrophil recruitment, inflammatory Th17 cell accumulation and colonic inflammation in <em>C. albicans</em> colonized mice</td>
</tr>
</tbody>
</table>

## Inventors:
- Iliyan D. Iliev
- Xin Li

## Patents:
- US Application Filed

## Publications:

## Biz Dev Contact:
- Brian Kelly
  - (646) 962-7041
  - bjk44@cornell.edu

## Cornell Reference:
- D-10153
# Treatment of Fungal-Associated Irritable Bowel Disease Using IL-1 Inhibitors

## Technology Applications

- Method for identifying IBD patients who may benefit from anti-IL-1 or antifungal therapies
- Platform for further studying the impact of the mycobiota on immunity and disease pathogenesis

## Technology Advantages

- Anti-IL-1 monoclonal antibodies are already approved for other indications
- Provides a precision medicine approach to identify IBD patients who are most likely to benefit from anti-IL-1 treatment

## Supporting Data / Figures

![Figure 1](image.png)

**Figure 1:** A: IL-1β induction is dependent on expression of ECE1, the factor which induces transition to hyphal morphology and expression of candidalysin. B: anti-IL-1R treatment improves markers of inflammation in mice colonized with *C. albicans.*

## Inventors:
Iliyan D. Iliev
Xin Li

## Patents:
US Application Filed

## Publications:

## Biz Dev Contact:
Brian Kelly
(646) 962-7041
bjk44@cornell.edu

## Cornell Reference:
D-10153