**Synthetic Biologics is developing cutting-edge therapeutics to treat pathogen-specific diseases**

- A late-stage clinical stage company developing therapeutics to protect the gut microbiome and restore the health of patients while targeting pathogen-specific diseases. Founded in 2001, Synthetic Biologics, Inc. trades on the NYSE MKT, LLC under the symbol "SYN". Located in Rockville, MD USA

- The Company's lead candidates poised for Phase 3 development are: (1) SYN-010 which is intended to reduce the impact of methane producing organisms in the gut microbiome to treat an underlying cause of irritable bowel syndrome with constipation (IBS-C), and (2) SYN-004 (ribaxamase) which is designed to protect the gut microbiome from the effects of certain commonly used intravenous (IV) beta-lactam antibiotics for the prevention of *C. difficile* infection (CDI), antibiotic-associated diarrhea (AAD) and the emergence of antimicrobial-resistance (AMR).

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**SYN-010**

**The Role of Methane in IBS-C**

A proprietary modified-release formulation of lovastatin lactone

**SYN-004 (ribaxamase)**

Degrading Residual IV β-lactam Antibiotics May Prevent *C. difficile* infection, antibiotic-associated diarrhea and antimicrobial resistance

SYN-004 is to be orally co-administered with intravenous β-lactam antibiotics

- Ribaxamase is designed to neutralize active β-lactam antibiotics in the GI tract and thus eliminate selective pressure

**Development Milestones**

<table>
<thead>
<tr>
<th>Therapeutic Area / Product Candidate</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBS-C – SYN-010:</td>
<td></td>
</tr>
<tr>
<td>Phase 1a/1b</td>
<td>1Q 2015 – Supportive topline Phase 1a/1b PK data</td>
</tr>
<tr>
<td>Phase 2a open-label</td>
<td>1Q 2015 – Supportive Phase 2a PK data</td>
</tr>
<tr>
<td>(1st ileostomy study; ceftriaxone)</td>
<td>1Q 2016 – Reported supportive Phase 2b topline data</td>
</tr>
<tr>
<td>Phase 2b open-label</td>
<td>2Q 2015 – Initiated Phase 2b trial</td>
</tr>
<tr>
<td>(2nd ileostomy study; ceftriaxone + PPI)</td>
<td>2Q 2016 – Report Phase 2b trial</td>
</tr>
<tr>
<td>Hold End of Phase 2 Meeting with FDA</td>
<td>3Q 2016 – Announce topline data from Phase 2b</td>
</tr>
<tr>
<td>Pivotal Phase 2b/3 trial</td>
<td>2017 – Initiate Phase 2b/3 trial</td>
</tr>
</tbody>
</table>

**CDI/AAD Prevention – SYN-004 (ribaxamase):**

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<tr>
<td>IBS-C – SYN-010:</td>
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<tr>
<td>Phase 2 (1st study; acute, placebo-controlled)</td>
<td>2Q 2015 – Initiated Phase 2</td>
</tr>
<tr>
<td>Phase 2 (2nd study; extension, SYN-010 42mg)</td>
<td>4Q 2015 – Reported Phase 2 topline data</td>
</tr>
<tr>
<td>Hold End of Phase 2 Meeting with FDA</td>
<td>Summer 2016</td>
</tr>
<tr>
<td>Pivotal Phase 2b/3 trial</td>
<td>2017 – Initiate Phase 2b/3 trial</td>
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</table>

**Product Pipeline**

**The Human Microbiome**

A collection of microorganisms living symbiotically in and around the human body

- Human body has 10 times as many microbial cells as human cells
- 99% of genes in the body are Microbial, NOT Human

**Advancing Gut Microbiome Therapeutics**

**The Human Microbiome**

**Human Genome**

- 23,000 Genes
- >1,000,000 Microbes

**Diseases Directly Influenced by the Gut Microbiome**

- Cholesterol Metabolic Syndrome
- Diabetes
- Inflammatory Bowel Disease
- Colon Cancer
- Metabolic Syndrome
- Central Obesity
- Alzheimer’s Disease
- Autoimmune Diseases
- Inflammatory Bowel Infection
- *C. difficile*
- Metabolic Syndrome
- Diabetes
- Obesity

**Synthetic Biologics, Inc.**

**Medical Affairs:**
Deb Mathews
dmathews@syntheticbiologics.com

**Investor Relations:**
Vincent Perrone
vperrone@syntheticbiologics.com

**Presented by:**
John F. Kokai-Kun
jkokai-kun@syntheticbiologics.com

**Therapeutic Area / Product Candidate Discovery Preclinical Phase 1 Phase 2 Phase 3**

<table>
<thead>
<tr>
<th>SYN - 010</th>
<th>IRRITABLE BOWEL SYNDROME-CONSTIPATION (IBS-C)</th>
<th>Oral modified-release lovastatin lactone</th>
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<tr>
<td>SYN - 004</td>
<td>Oral enzyme to degrade IV β-lactam Antibiotics</td>
<td>Prevention of <em>C. difficile</em> infection (CDI)</td>
</tr>
<tr>
<td>SYN - 004</td>
<td>Oral enzyme to degrade IV Carbenem Antibiotics</td>
<td>Prevention of CDI</td>
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<td>Prevention of CDI</td>
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**C. difficile**

Pathogen-specific diseases

**Biotherapeutics**

- Phenylketonuria (PKU)
- Monoclonal antibodies
- SYN-005 I,T

**Oral enzyme to degrade orally administered beta-lactam Antibiotics**

**Oral intestinal alkaline phosphatase**

**Oral enzyme to degrade IV β-lactam Antibiotics**

**Oral enzyme to degrade orally administered beta-lactam Antibiotics**

**Oral enzyme to degrade IV Carbenem Antibiotics**

**Preserves native microbiome and barrier/Treat Inflammation**

**Preserves native microbiome and barrier/Treat Inflammation**

**Dense Biome Medical Center collaboration**
**Intrexon Corporation collaboration**
**The University of Texas at Austin collaboration**

**The Role of Methane in IBS-C**

**M. smithii** archaea to reduce methane and alleviate the symptoms of irritable bowel syndrome with constipation