Forward - Looking Statement

This presentation contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, adopted pursuant to the Private Securities Litigation Reform Act of 1995. Statements other than statements of historical fact contained in this presentation, including statements regarding strategy, future operations, future financial position, future revenue, projected costs, prospects, plans, objectives of management and expected market growth are forward-looking statements. The words “anticipate,” “believe,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “potential,” “predict,” “project,” “should,” “target,” “will,” “would” and similar expressions are intended to identify forward- looking statements, although not all forward-looking statements contain these identifying words.

Forward-looking statements involve known and unknown risks, uncertainties and other important factors that may cause actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. These risks and uncertainties include, but are not limited to: our ability to obtain additional financing; our use of the net proceeds from our initial public offering; the accuracy of our estimates regarding expenses, future revenues and capital requirements; the success and timing of our preclinical studies and clinical trials; our ability to obtain and maintain regulatory approval of RP-G28 and any other product candidates we may develop, and the labeling under any approval we may obtain; regulatory developments in the United States and other countries; the performance of third-party manufacturers; our plans to develop and commercialize our product candidates; our ability to obtain and maintain intellectual property protection for our product candidates; the successful development of our sales and marketing capabilities; the potential markets for our product candidates and our ability to serve those markets; the rate and degree of market acceptance of any future products; the success of competing drugs that are or become available; and the loss of key scientific or management personnel. For a discussion of these and other factors that could cause actual results to differ from those contemplated in the forward-looking statements, please see the discussion under “Risk Factors” and other information contained in our Quarterly Report on Form 10-Q for the quarterly period ended December 31, 2016 and in our publicly available filings with the Securities and Exchange Commission.

The forward-looking statements in this presentation represent our views as of the date of this presentation. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make, so you should not place undue reliance on our forward-looking statements. We do not undertake any responsibility to update or revise any of these factors or to announce publicly any revisions to forward-looking statements, whether as a result of new information, future events or otherwise.

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## Financial Snapshot: RTTR

### Stock Information*

<p>| | |</p>
<table>
<thead>
<tr>
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<tr>
<td><strong>Exchange</strong></td>
<td>NASDAQ</td>
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<tr>
<td><strong>Symbol</strong></td>
<td>RTTR</td>
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<tr>
<td><strong>Recent Price</strong></td>
<td>$3.43</td>
</tr>
<tr>
<td><strong>52 Week Range</strong></td>
<td>$1.03 - $3.75</td>
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<tr>
<td><strong>Market Cap</strong></td>
<td>$39.85 Million</td>
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<tr>
<td><strong>Shares Outstanding</strong></td>
<td>11.62 Million</td>
</tr>
<tr>
<td><strong>Avg. 3 Month Vol</strong></td>
<td>175K Shares</td>
</tr>
</tbody>
</table>

*As of February 8, 2017*
• Develop novel therapeutics that **selectively modulate the gut microbiome**

• Lead product candidate, RP-G28, has the potential to become the **first FDA-approved Rx for lactose intolerance**

• **Significant specialty market** with unmet need
  – 9 million with moderate/severe lactose intolerance in the U.S.
  – >$1.2 billion U.S. market opportunity for an Rx treatment

• **Phase 2b/3 completed**, Data readout expected in Q1 2017

• Discovering the role functional gut microbiome changes have on improving gut health
  • Pre-clinical and clinical development efforts in high prevalent diseases of significant unmet need: Gastrointestinal, Metabolic, Liver Disease, and Immuno-oncology
Established Leadership in the Microbiome

• Founded by Andrew and Ira Ritter to develop a treatment for Andrew’s lactose intolerance
  – Proof-of-concept achieved through first-generation OTC formulation (Lactagen®)
  – Clinical trial and three consumer studies confirmed symptom reduction in 80% of patients\(^1\) (>15,000 patients)

• One of the most advanced therapeutics in microbiome research & development
  – Proof-of-concept demonstrated in 62 subject - Phase 2a study
  – Reasonable, low cost clinical development program

• Strong intellectual property portfolio and NCE status

• World-renowned scientific advisors and strong executive leadership

1. Lactagen Clinical Data and Customer Experience Analysis
Key Demographics¹

- **>1 billion** global lactose intolerant population
  - **65 million** in Europe
  - **90 million** in Japan
- **40 million** U.S. lactose intolerant population
  - **9 million** are moderate/severe patients
- U.S. prevalence rates:
  - 90% Asian descent
  - 85% African descent
  - 75% Hispanic descent

No prescription drug currently available for LI despite patient desire and need for a prescription treatment

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Global Penetration Rates of Lactose Intolerance²

Unsatisfactory Treatment Options

Significant $ Spend on OTC Products

OTC Product Sales

- **$2.45 billion** FY2015 annual sales in U.S. for OTC LI products

- **$400/person** annual spend on LI management options

Current Treatments Lack Solution

- **60%** of patients *continue to seek* a better *solution* – reinforces unsatisfactory treatment options:
  - Challenging to avoid all dairy and “hidden” lactose can cause unexpected symptoms
  - Lactase Supplements are inconvenient and not reliable

- **High importance** - Patients want to be able to consume dairy foods without worrying about symptoms

---

1. Lactose Intolerance Market Analysis Report - 2012
3. Internal Formula – Lactaid Purchase 3x Month x 12 Months
Patients Want Treatment
Symptoms Driving Strong Consumer Demand

Symptoms
• **82%** of lactose intolerance patients experience symptoms **weekly** or **more frequently**
• >**50%** report their lactose intolerance **moderately** or **severely** impacts their daily activities
• Long-term health concerns
  • Osteoporosis, hypertension

*LI Impacts Patient’s Daily Activity*

<table>
<thead>
<tr>
<th>Impact</th>
<th>Slightly Impacts</th>
<th>Moderately Impacts</th>
<th>Severely Impacts</th>
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</thead>
<tbody>
<tr>
<td>Doesn’t Impact</td>
<td>18%</td>
<td>38%</td>
<td>15%</td>
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<tr>
<td>Slightly</td>
<td>30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severely</td>
<td></td>
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</tbody>
</table>

Treatment Demand
• **78%** of LI patients are interested in consuming dairy products without discomfort
• LI patients are **VERY** likely to **ASK** for and **TAKE** an FDA-approved treatment
• >**70%** of LI patients are “extremely interested” or “interested” in an FDA-approved treatment

*Consumer Interest in FDA Approved Drug to Treat Lactose Tolerance*

<table>
<thead>
<tr>
<th>Interest Level</th>
<th>Extremely Interested</th>
<th>Interested</th>
<th>Slightly Interested</th>
<th>Not Interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>LI Impacts Patient’s Daily Activity</td>
<td>38%</td>
<td>35%</td>
<td>18%</td>
<td>9%</td>
</tr>
</tbody>
</table>

• Modulates the gut microbiome
  – Stimulates growth of beneficial colonic bacteria (specifically lactose metabolizing bacteria)
• Novel, non-digestible oligosaccharide
  – Ultra high-purity
  – Not absorbed during transit through GI tract/non-systemic
• Expected one-time, 30-day course of treatment
  – Substantial durability of treatment effect expected (years)
  – Patients can be re-treated if needed
• Delivered in a sachet powder, mixed with water

Target claim:
For the treatment of lactose intolerance
Mechanism of Action

Microbiome Modulation

Lactose Intolerance:
- **Inadequate lactase activity**, lactose not broken down properly
- Bacteria in GI tract **ferment lactose, causing gas**
- Leads to gastric symptoms: abdominal pain, gas, cramping, bloating, diarrhea

RP-G28 Promotes Colonic Adaptation
- Stimulates and **adapts the bacteria in GI tract to metabolize lactose**
  - Increase lactose-metabolizing bacteria
  - Decrease gas producing bacteria
- Lactose is broken down, **reducing gas production and gastric symptoms**
RP-G28: Lactose Intolerance

Pre-Clinical

- No additional non-clinical studies to support phase 2b/3
- Minor toxicology / animal bridging studies (not required for P2 or P3)

Phase 1

- Proven safety enabled bypass of phase 1; The family of compounds is generally regarded as safe (GRAS) by regulators

Phase 2a (n = 62)

- Explored mode of action and endpoints, supporting meaningful patient benefit
- Clarified dosing regimen
- Consultation from FDA (Type C Meeting), completed

Phase 2b/3 (n = 377)

- Establish efficacy signals
- Explore primary and secondary endpoints
- Explore optimal dose

Last Patient Completed

Pioneering Development in the Gut Microbiome for the Treatment of Lactose Intolerance
www.ritterpharma.com
Phase 2a: Study Design & Protocol Overview

- **62-subject, double-blind placebo controlled multi-centered trial**
  - Dosed 1.5g/d increased forced titration to 15g/d over 35 days BID

- **Inclusion criteria to validate lactose intolerance**
  - Positive hydrogen breath test (20 ppm HBT > baseline)
  - Moderate to severe symptoms based on a lactose challenge (>12 on total symptoms)

- **Endpoints**
  - Lactose digestion (measured by breath hydrogen)
  - Lactose intolerance symptoms (after a 25g lactose challenge)
  - Microbiome sequencing and genetic analysis of colonic microflora

---

Day 0  
Baseline  
25g Lactose Challenge, HBT Stool Collection

Day 36  
RP-G28  
(n=42)

Day 66  
Dairy Encouraged

Follow-up  
25g Lactose Challenge, HBT Stool Collection

---

Day 0  
Baseline  
25g Lactose Challenge, HBT Stool Collection

Day 36  
RP-G28  
(n=42)

Day 66  
Dairy Encouraged

Follow-up  
25g Lactose Challenge, HBT Stool Collection

---

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RP-G28  
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25g Lactose Challenge, HBT Stool Collection

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Day 0  
Baseline  
25g Lactose Challenge, HBT Stool Collection

Day 36  
RP-G28  
(n=42)

Day 66  
Dairy Encouraged

Follow-up  
25g Lactose Challenge, HBT Stool Collection
Phase 2a Clinical Data
Demonstrated Safety & Efficacy

- Well tolerated, no SAEs reported
- Treated patients were 6x more likely to be lactose tolerant (p=0.039)
- Durable reduction in abdominal pain at Day 36 & Day 66 (p=0.019)
- 70% reduction in abdominal pain at Day 36


1. Patients reporting “tolerance to dairy foods” at day 66
2. Abdominal pain responder defined as number of patients that reported NO pain at both Day 36 & Day 66 time points
Phase 2a Microbiome Data
Mechanism of Action - Validated

• 82% of subjects on treatment showed significant alterations in their microbiome
  • Composition shifts correlated with clinical outcomes of improved lactose tolerance

• 90% of treated patients had a bifidogenic response

• Lactose metabolizing bacteria increased:
  • Faecalibacterium, Roseburia, Lactobacilli and Bifidobacterium

• Change in the fecal microbiome of treated subjects maintained for 30-days post-treatment

Changes in Operational Taxonomic Units (OTUs)
by Terminal Restriction Fragment Length Polymorphism (TRFLP) Analysis

Data published in Proceedings of the National Academy of Sciences, 2017

1 M. Andrea Azcarate-Peril, et al. DDW Conference; 2013 May 18-21; Orlando, FL.
Phase 2b/3 Clinical Trial Protocol Design

<table>
<thead>
<tr>
<th>Screening Phase</th>
<th>Treatment Phase</th>
<th>Post-Treatment Phase</th>
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<tbody>
<tr>
<td>Screening &amp; Randomization</td>
<td>Group A</td>
<td>Post Treatment Measurements</td>
</tr>
<tr>
<td>Baseline Measurements</td>
<td>RP-G28</td>
<td>30 Day Dairy Consumption</td>
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<tr>
<td></td>
<td>Low Dose</td>
<td>Post Dairy Measurements</td>
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<tr>
<td></td>
<td>Group B</td>
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<td></td>
<td>RP-G28</td>
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<td></td>
<td>High Dose</td>
<td></td>
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<td>Group C</td>
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<td></td>
<td>Placebo</td>
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</table>

No Dairy Consumption

- **Day(s)**: 1-30
- **Day(s)**: 31
- **Day(s)**: 61

- Double-blind, placebo-controlled, multicenter trial, n=377
- Potential classification as a pivotal trial
- Determine maximum tolerated dose & optimal dose-escalation schedule
- **Inclusion / Exclusion**
  - Blinded lactose challenge, cardinal symptoms measured by 11-point numerical rating scale and Bristol stool test, Hydrogen Breath Test measured lactase deficiency
- Optional open-label 12-month durability extension study
Regulatory & Clinical Timelines

- **2016**
  - Q4: FDA – Type C Meeting
  - Phase 2b/3 Last Patient Visit

- **2017**
  - Q1: Topline Data Readout
  - Q2: FDA - End of Phase 2 Meeting

- **2018**
  - Q1: Phase 3 Clinical Program
  - Q2: 
  - Q3: 

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Pioneering Development in the Gut Microbiome for the Treatment of Lactose Intolerance
www.ritterpharma.com
Indication Development Pipeline
Clinical & Pre-Clinical Development Efforts

- Discovering the functionality and the therapeutic potential gut microbiome changes may have on treating/preventing a variety of disease states:
  - Gastrointestinal, Metabolic, Liver Disease, and Immuno-oncology
- Partnering with renowned academic centers

<table>
<thead>
<tr>
<th>Condition</th>
<th>Discovery</th>
<th>Preclinical</th>
<th>IND</th>
<th>Clinical</th>
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<tbody>
<tr>
<td>Lactose Intolerance</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Metabolic Syndrome</td>
<td></td>
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<tr>
<td>Environmental Enteropathy</td>
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<tr>
<td>Liver Disease (NASH &amp; NAFLD)</td>
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<tr>
<td>Immunology / Oncology</td>
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Strong Intellectual Property:  

11 Issued Patents

- Composition & Methods of Use: 7 Issued patents covering U.S. & U.K.
- Manufacturing Processes: 4 Issued patents covering the U.S. and multiple international markets
- NCE market exclusivity (supplemental to patents)
  - From date of approval, est. of 5 years in U.S. and 8 years in Europe
- Additional information
  - Patents expiring in 2030 (2035 with NCE market exclusivity)
  - 24 pending patent applications in the U.S. and other key international markets
  - RP-G28 is not absorbed into the bloodstream, thus formulation options for follow-on/generic products may be limited

IP Counsel: Knobbe, Martens Olson & Bear LLP

Composition Claim Patent: GB2480042
Manufacturing Patents: US 9,200,303, EP 2462234, IT 1395068, ZL 201080035013.2
## Leadership and Management

<table>
<thead>
<tr>
<th>Name</th>
<th>Role Description</th>
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<tbody>
<tr>
<td>Ira E. Ritter</td>
<td>Chairman, Co-Founder, Chief Strategic Officer</td>
</tr>
<tr>
<td></td>
<td>40+ years serving on Executive Boards; Rockwood, Oak Media, RG Publishing</td>
</tr>
<tr>
<td></td>
<td>• President and Chairman of Rockwood, produced over 200 private label HBA products for major national retailers including GNC and K-Mart</td>
</tr>
<tr>
<td>Michael D. Step</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td></td>
<td>25+ years of experience in the pharmaceutical industry</td>
</tr>
<tr>
<td></td>
<td>• Recently, Sr. VP Corp. Development at Santarus (acquired by Salix in 2014); formerly VP Corp. Development at Amylin Pharmaceuticals and positions at Dura Pharmaceuticals, Hoffmann-La Roche &amp; Syntex Labs</td>
</tr>
<tr>
<td>Andrew J. Ritter</td>
<td>Co-founder and President</td>
</tr>
<tr>
<td></td>
<td>15+ years of research in gastrointestinal diseases</td>
</tr>
<tr>
<td></td>
<td>• Former President of Ritter Natural Sciences, developed and marketed digestive healthcare products. Wharton MBA</td>
</tr>
<tr>
<td>Ellen Mochizuki</td>
<td>Vice President of Finance</td>
</tr>
<tr>
<td></td>
<td>27+ years of financial accounting experience</td>
</tr>
<tr>
<td></td>
<td>• Consulted with various biopharmaceutical companies; formerly the Dir. Of Accounting for Northrop Grumman Corp., and Sr. VP at IndyMac Bank</td>
</tr>
<tr>
<td>William Gannon, M.D.</td>
<td>Medical Monitor</td>
</tr>
<tr>
<td></td>
<td>25+ years of drug development experience</td>
</tr>
<tr>
<td></td>
<td>• Extensive regulatory, medical and scientific knowledge in GI, Oncology, Rheumatology among other diseases</td>
</tr>
<tr>
<td></td>
<td>• Former Chief Medical Officer at Apthera</td>
</tr>
<tr>
<td>Erika Jones</td>
<td>Director of Clinical Operations</td>
</tr>
<tr>
<td></td>
<td>18+ years of clinical drug development experience</td>
</tr>
<tr>
<td></td>
<td>• Managing Phase I, II, III; globally</td>
</tr>
<tr>
<td></td>
<td>• Held clinical development roles at Illumina, GE Healthcare, Pfizer, Elan</td>
</tr>
<tr>
<td>Noah Voreades, M.S.</td>
<td>Corporate Development Manager</td>
</tr>
<tr>
<td></td>
<td>4 years of microbiome research and corporate development experience</td>
</tr>
<tr>
<td></td>
<td>• Held business development &amp; sales roles at Illumina and Metabiomics</td>
</tr>
</tbody>
</table>

### Board of Directors

<table>
<thead>
<tr>
<th>Name</th>
<th>Role Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ira E. Ritter</td>
<td>Chairman</td>
</tr>
<tr>
<td>Matthew W. Foehr</td>
<td>President &amp; COO, Ligand Pharmaceuticals</td>
</tr>
<tr>
<td>Gerald T. Proehl</td>
<td>President &amp; CEO, Dermata Former President &amp; CEO, Santarus</td>
</tr>
<tr>
<td>William Merino, Ph.D.</td>
<td>Former Sr. VP Worldwide Regulatory Affairs at Warner Lambert Pharmaceuticals</td>
</tr>
<tr>
<td>Paul V. Maier</td>
<td>Former CFO, Sequenom, Inc.</td>
</tr>
<tr>
<td>Michael D. Step</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>Andrew J. Ritter</td>
<td>Co-founder and President</td>
</tr>
<tr>
<td>Noah J. Doyle</td>
<td>Managing Director, Javelin Ventures</td>
</tr>
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# Medical Advisory Board

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>Dennis Savaiano, Ph.D.</td>
<td>Chair Professor of Foods &amp; Nutrition &amp; Associate Provost at Purdue University Considered one of the foremost experts on lactose intolerance in the world</td>
</tr>
<tr>
<td>W. Allan Walker, M.D.</td>
<td>Director of the Division of Nutrition at Harvard Medical School</td>
</tr>
<tr>
<td>William J. Sandborn, M.D.</td>
<td>Chief, Division of Gastroenterology and Director at University of California San Diego Inflammatory Bowel Disease Center and Professor of Clinical Medicine</td>
</tr>
<tr>
<td>Todd Klaenhammer, Ph.D.</td>
<td>Director of the Southeast Dairy Foods Research Center &amp; Professor of Food Science, Microbiology &amp; Genetics at North Carolina State University; National Academy of Science Member</td>
</tr>
<tr>
<td>Byron L. Cryer, M.D.</td>
<td>Professor of Medicine in Digestive &amp; Liver Diseases and Associate Dean at the University of Texas Southwestern Medical Center at Dallas &amp; the North Texas VA Health Care System</td>
</tr>
<tr>
<td>Warren Grundfest, M.D., FACS</td>
<td>Professor at the University of California Los Angeles</td>
</tr>
<tr>
<td>Harry Greene, M.D.</td>
<td>Former Chief, Division of Pediatric Gastroenterology / Nutrition and Director of the NIH sponsored Clinical Nutrition Research Unit</td>
</tr>
<tr>
<td>Roger Clemens, Ph.D.</td>
<td>Associate Director of the Regulatory Science Program at the University of Southern California’s School of Pharmacy</td>
</tr>
</tbody>
</table>
• Lead product candidate has potential to become the first FDA-approved drug for lactose intolerance  
  – 9 million with moderate/severe symptoms
• Phase 2b/3 completed, potential pivotal trial  
  – Data readout expected in Q1 2017
• Colonic adaptation technology has potential in multiple other indications
• Strong intellectual property portfolio and NCE status

Investment Highlights Summary
Microbiome Therapeutics Improving Human Health
Thank You

Ritter Pharmaceuticals, Inc.

www.RitterPharma.com