March 30, 2022

# FIRST WAVE BIOPHARMA, INC.

## (NASDAQ: FWBI)

Industry: BioPharma

Price Target: $16.00

# FIRST WAVE BIOPHARMA, INC.

## Top-Line Trial Results, Potential First Royalties to Drive Shares Higher

Rob Goldman
rob@goldmanresearch.com

March 30, 2022

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|---|---|
| Industry: BioPharma | 12 Mo. Price Target: $16.00 |

### COMPANY SNAPSHOT

First Wave BioPharma is a clinical-stage biopharmaceutical company specializing in the development of targeted, non-systemic therapies for gastrointestinal (GI) diseases. The Company is currently advancing a therapeutic development pipeline with multiple clinical stage programs and indications built around its two proprietary technologies – niclosamide, an oral small molecule with anti-viral and anti-inflammatory properties, and the biologic adrulipase, a recombinant lipase enzyme designed to enable the digestion of fats and other nutrients. The portfolio is led by clinical programs in Phase 2 clinical trials, including for COVID-19 gastrointestinal infections.

### KEY STATISTICS

| | |
|---|---|
| Price as of 3/29/22 | $1.13 |
| 52 Week High – Low | $13.90 - $1.00 |
| Est. Shares Outstanding | 16.7M |
| Market Capitalization | $18.9M |
| Average Volume | 147,854 |
| Exchange | NASDAQ |

### COMPANY INFORMATION

**First Wave BioPharma, Inc.**
777 Yamato Road
Suite 502
Boca Raton FL 33431

Web: https://www.firstwavebio.com/
Email: info@firstwavebio.com
Phone : 561.589.7020

### INVESTMENT HIGHLIGHTS

**Driven by upcoming milestones, we believe FWBI is set to enjoy a rise in its share price. FWBI is slated to publish top-line clinical results for its Phase 2 COVID-19 GI trial in 1H22.** We believe results will be favorable and attract a licensing partner in the form of Big Pharma, leading to potential first royalties later this year.

**The Company boasts 2 key assets, 6 indications, and 4 Phase 2 clinical programs, along with a novel, proprietary micronized formulation.** Management has a history of exits and successful product development. We believe FWBI will enjoy similar success.

**Management's strategy is to acquire assets for development and out-licensing that represent multi-billion-dollar indications and unmet needs.** A core tenet is improving outcomes and quality of life such as producing oral formulations versus other, painfully administered drugs.

**FWBI has a series of trials slated to commence or be prepared for top-line results in 2H22 and through 2023.** These include multi-billion-dollar IBD-related trials and other GI indications.

**We project FWBI could generate more than $1M in royalties in 2022 and $50M in 2023, whereby it may achieve a 22% operating margin.**

**Our $16 price target reflects the Net Present Value of a multiple on FWBI's future operating income, discounted back by 15% per annum.** This target is a modest premium to its 52-week high.

# COMPANY OVERVIEW

*The View from 30,000 Feet*

**First Wave BioPharma, Inc. (NASDAQ – FWBI)** appears poised to emerge as a leader in the treatment of chronic, debilitating gastrointestinal diseases affecting millions of Americans. The Company seeks to improve outcomes and quality of life through the development of key assets that represent six indications, including four Phase 2 clinical programs. FWBI has been awarded five patents with six pending. One of the patents covers a novel, proprietary micronized formulation of one of its assets that has been around since 1982 and carries a historical, favorable safety profile. Management's approach is to acquire assets that can be developed through mid-stage clinical trials for indication(s) representing an unmet need with billions in market opportunity. Upon the achievement of positive top-line results for a specific indication, FWBI seeks to attract a partner to out-license the asset for a condition that represents billions in market opportunity. The FWBI leadership team has a history of exits and successful product development and we believe that the Company can replicate previous successes. The stock has suffered in recent months from a downturn in biotechs and the Street's misunderstanding of its late 2021, key M&A event. However, FWBI is slated to release top-line results of a Phase 2 clinical trial that should serve as the first catalyst to drive the stock back towards its 52-week high of $13.90 and our $16 price target over the next 12 months.

*The Assets, The Indications*

First Wave BioPharma is a clinical-stage biopharmaceutical company specializing in the development of targeted, non-systemic therapies for gastrointestinal (GI) diseases. The Company is currently advancing a therapeutic development pipeline with multiple clinical stage programs built around its two proprietary technologies – niclosamide, an oral small molecule with anti-viral and anti-inflammatory properties, and the biologic adrulipase, a recombinant lipase enzyme designed to enable the digestion of fats and other nutrients. First Wave BioPharma's niclosamide portfolio is led by two clinical programs in Phase 2 clinical trials: FW-COV for COVID-19 gastrointestinal infections and FW-UP for ulcerative proctitis (UP) and ulcerative proctosigmoiditis (UPS), two forms of ulcerative colitis. Three additional indications of niclosamide, include FW-ICI-AC, for Grade 1 and Grade 2 Immune Checkpoint Inhibitor-associated colitis and diarrhea in advanced oncology patients, FW-UC (ulcerative colitis) and FW-CD (Crohn's disease). The Company is also advancing FW-EPI (adrulipase) for the treatment of exocrine pancreatic insufficiency (EPI) in patients with cystic fibrosis and chronic pancreatitis.

*FW-COV*

GI symptoms (severe diarrhea, vomiting and abdominal pain) have been reported in approximately 18% of COVID-19 cases. Of the approximately 80 million individuals who are reported to have contracted COVID-19 in the U.S., this would translate into over 14 million patients having GI infection. Approximately 86% of these COVID "long haulers" are reported to have GI infection symptoms, with 60% continuing to have diarrhea months after their initial infection. With no treatment available for Covid-19-related diarrhea, a large, unmet medical need exists for this surprising post-Covid-19 virus contraction. Based upon a conservative, back-of-the-envelope forecast of hundreds of dollars in revenue per patient for this market, we arrive at a preliminary market opportunity in the billions. Royalty revenue to FWBI could begin late this year, perhaps with a major COVID-19 player as a partner, like **Pfizer (NYSE:PFE)** or **Merck (NYSE:MRK)**.

*The IBD Indications*

According to the Crohn's and Colitis Foundation, between 1.6 million and 3.1 million patients in the U.S are estimated to suffer from inflammatory bowel diseases (IBD), namely Ulcerative Colitis (UC) and Crohn's Disease (CD). On the low-end, there are roughly 830,000 patients in the US diagnosed with UC, representing a $5 billion market, including $4.6 billion for mild-moderate sufferers. An estimated 660,000 (500,000 mild/moderate) suffer from CD in the US, with an approximate market size of $7.4 billion, or $4.3 billion mild/moderate cases.

FWBI currently has IBD trials that reflect the first use of niclosamide as an anti-inflammatory therapeutic to treat ulcerative colitis. This is significant for a few reasons. One interesting point is that it reflects one tenet of the Company's treatments is quality of life. For example, the standard treatments for UP and UPS are administered rectally. FWBI is currently utilizing a topical formulation of niclosamide in the FW-UP trial but is developing an oral micronized tablet for use with all ulcerative colitis indications – including UP, UPS, and pancolitis . Given the quality-of-life model along with positioning as a second-line therapy, we believe that FWBI can achieve clinical and monetization success in multiple IBD indications.

*Cystic Fibrosis GI*

Adrulipase is a recombinant lipase enzyme derived from the *Yarrowia lipolytica* yeast that FWBI is developing for the treatment of exocrine pancreatic insufficiency (EPI) associated with cystic fibrosis and chronic pancreatitis. FWBI is pursuing parallel monotherapy (FW-EPI) and combination therapy clinical pathways with adrulipase (FW-EPI+PERT). The Company reported topline results in 2021 from two Phase 2 clinical trials.

EPI affects the pancreas by hindering the body's ability to digest food. According to data provided by FWBI, 30,000 cystic fibrosis patients suffer from EPI and severe EPI and an estimated 90,000 chronic pancreatitis in the US have EPI. This $2 billion global market is yearning for a favorable solution that would serve as an alternative to the current porcine enzyme replacement therapy. The current therapy has existing safety and supply issues and requires the consumption of 25-40 pills daily, a substantial burden on the patient. Adrulipase would require just a handful of pills – currently estimated at 5-8 per day. Management expects to initiate a Phase 2b monotherapy trial during the second half of 2022.

*Valuation/Price Target*

Our current forecasts for 2021 assume a net loss of roughly ($86,000) with ($59,700) coming from operating expenses and the balance from items below the operating line. For 2022, we project $1.1 million in royalty revenue attributed to FW-COV, as we outlined above. Our $50 million in royalties for 2023 primarily reflect royalties and/or revenue share attributed to FW-COV and a small amount for FW-UP as well. We project a 22% operating margin and $0.40 in EPS using an estimated weighted shares outstanding figure. We believe these figures to be conservative and could track considerably higher for FW-COV.

We have elected to establish a valuation and price target based on the Net Present Value of a 5x operating income multiple achieved in ten years (2031) and discounted back at rate of 15%. We modeled operating income of revenue of $228 million and arrived at a present value of $568 million. By using the fully diluted 35.7 million

shares outstanding figure, we arrive at an NPV, or price target of $16. Given the bright future and additional potential indications with adrulipase, upside to our NPV exists, an opportunity we will explore later this year.

## A PRIMER: TARGET MARKETS, INDICATIONS

FWBI is a clinical stage biotechnology company currently focused on the development of targeted, non-systemic therapies for Inflammatory Bowel Diseases (IBD). The Company has two assets, niclosamide and adrulipase, that represent six indications, including four current Phase 2 GI clinical programs. Given the multiple indications that could each potentially serve multi-billion-dollar markets, and FWBI's related proprietary micronized oral formulations, we view niclosamide as a platform rather than simply an asset. Looking ahead, we project that niclosamide could be monetized via royalties for many indications in the GI space and beyond.

*The GI Market*

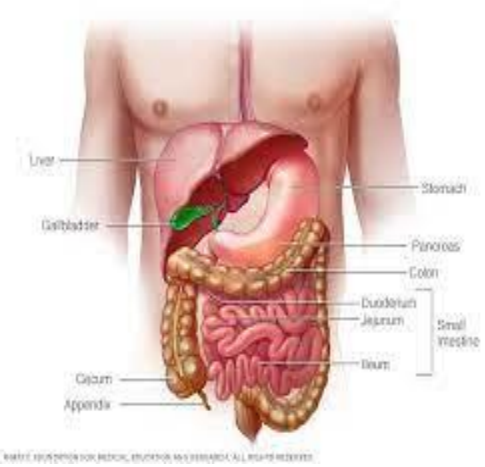



*Figure 1: The Digestive System*
Source: Mayo Clinic

According to the Crohn's and Colitis Foundation, between 1.6 million and 3.1 million patients in the U.S are estimated to suffer from IBD, namely Ulcerative Colitis (UC) and Crohn's Disease (CD). On the low-end, there are roughly 830,000 patients in the US diagnosed with UC, representing a $5 billion market, including $4.6 billion for mild-moderate sufferers. An estimated 660,000 (500,000 mild/moderate) suffer from CD in the US, with an approximate market size of $7.4 billion, or $4.3 billion mild/moderate cases.

A high-level description of these diseases and conditions is found below, sourced from The Mayo Clinic. UC is an inflammatory bowel disease (IBD) that causes inflammation and ulcers (sores) in the digestive tract, affecting the innermost lining of the colon and rectum. Ulcerative colitis can be debilitating and can sometimes lead to life-threatening complications. Symptoms vary but include diarrhea, often with blood, abdominal pain and cramping, rectal pain and bleeding, weight loss, fatigue, etc.

The two types of UC we are highlighting in FWBI's pipeline are Ulcerative Proctitis and Proctosigmoiditis, two forms of Ulcerative Colitis. Ulcerative Proctitis is an inflammation that is confined to the area closest to the anus (rectum while Proctosigmoiditis is an inflammation involving the rectum and sigmoid colon — the lower end of the colon.

CD causes inflammation of the digestive tract, which can lead to abdominal pain, severe diarrhea, fatigue, weight loss and malnutrition. Inflammation caused by Crohn's disease can involve different areas of the digestive tract in different people. This inflammation often spreads into the deeper layers of the bowel. With Crohn's Disease, any part of the small or large intestine can be involved, and it may be continuous or may involve multiple segments. Signs and symptoms of Crohn's can range from mild to severe leading to bowel obstructions and ulcers. They usually develop gradually, but sometimes will come on suddenly, without warning. Symptoms are similar to UC but can also include pain near or around the anus due to inflammation from a tunnel into the skin.

IBD sufferers' quality of life can be poor as symptoms are chronic, sudden, and can be painful, debilitating, and embarrassing, leaving sufferers with a social stigma. The estimated direct and indirect IBD healthcare costs range between $15 billion and $32 billion. No cause has been directly identified or attributed to these diseases and a number of treatments are available that target symptoms with mixed effectiveness. In the case of IBD, anti-inflammatory drugs are prescribed yet are often taken as rectally, or in combination with oral medications. In more severe cases, corticosteroids and immune systems suppressors or biologics can be prescribed. Despite a wide array of FDA-approved treatments, remission fails to occur in 50% or more of the patients.

Current high price tag/limited efficacy drugs broadly used in the GI and specifically the IBD market include:

Anti-inflammatories - sulfasalazine, mesalamine, balsalazide, and olsalazine, prednisone, budesonide
Immunosuppressants - mercaptopurine, cyclosporine, Xeljanz
Biologics - Stelara, Entyvio, Remicade, Humira, Tysabri (used brand names due to status)

*COVID-19 GI Infections: Unique Opportunity*

Interestingly, GI symptoms (severe diarrhea, vomiting and abdominal pain) have been reported in approximately 18% of COVID-19 cases. Of the approximately 80 million individuals who are reported to have contracted COVID-19 in the U.S., this would translate into over 14 million patients having GI infection. Of the 477 million cases reported globally, it would translate into almost 86 million patients. Furthermore, approximately 10% of patients who were infected with COVID have persistent symptoms months after their initial diagnosis. Approximately 86% of these COVID "long haulers" are reported to have GI infection symptoms, with 60% continuing to have diarrhea months after their initial infection. With no treatment available for Covid-19-related diarrhea, a large, unmet medical need exists for this surprising post-Covid-19 virus contraction. Based upon a conservative, back-of-the-envelope forecast of several hundred dollars in revenue per patient for this market, we arrive at a preliminary market opportunity in the billions. Typical royalty arrangements in this case may result in 15-20% of revenue to FWBI. Given the timing, we believe the first monetizable indication for niclosamide is for acute COVID-19 GI infections in out-patient settings, followed by "Long" COVID-19 GI infections with revenue levels based upon market penetration of the third-party partner.

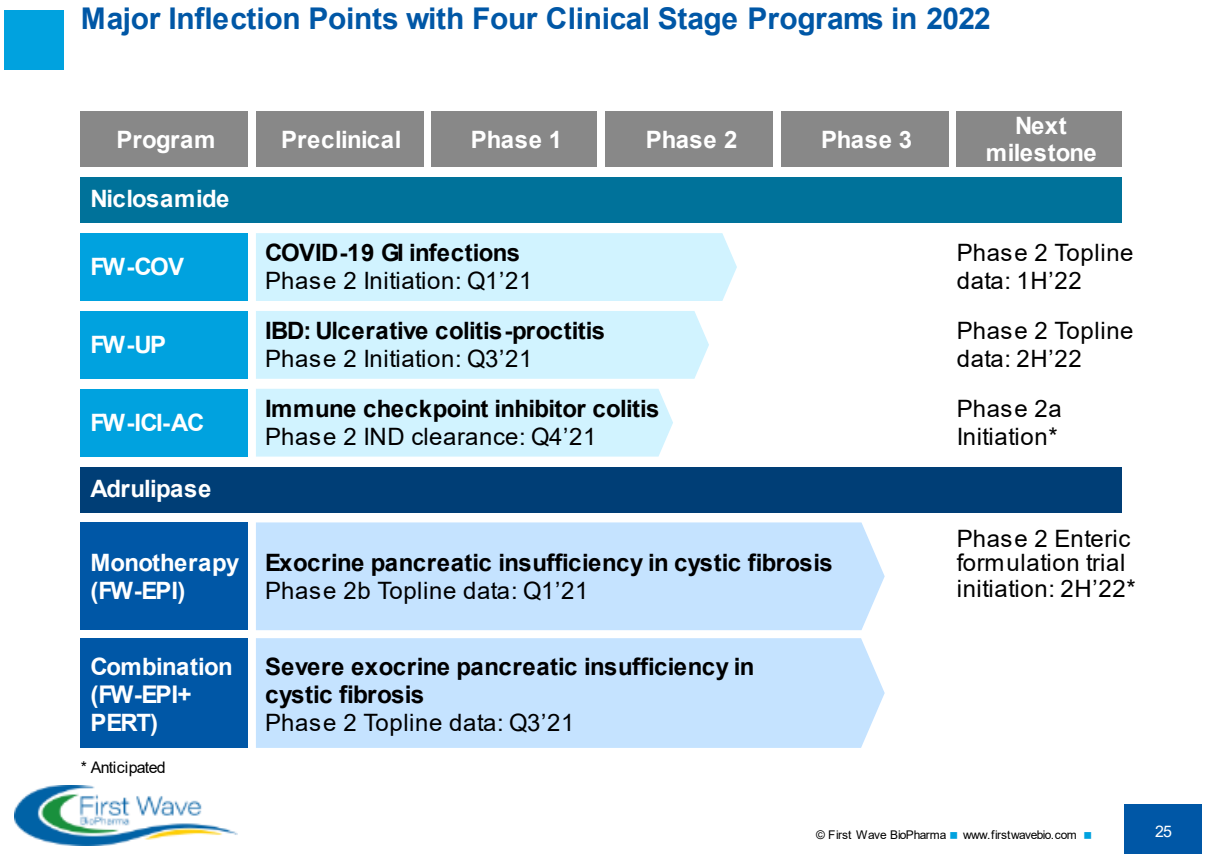
*Cystic Fibrosis & Digestion: Serving Major Unmet Need*

Cystic fibrosis (CF) is an inherited disorder that causes severe damage to the lungs, digestive system and other organs in the body. Cystic fibrosis affects the cells that produce mucus, sweat and digestive juices. These secreted fluids are normally thin and slippery. But in people with CF, a defective gene causes the secretions to become sticky and thick. Instead of acting as lubricants, the secretions plug up tubes, ducts and passageways, especially in the lungs and pancreas. One sub-condition of CF is exocrine pancreatic insufficiency. EPI affects the pancreas by hindering the body's ability to digest food. According to data provided by FWBI, 30,000 patients suffer from EPI and severe EPI and an estimated 90,000 from chronic pancreatitis in the US. This $2 billion global market is yearning for a favorable solution that would serve as an alternative to the current porcine enzyme replacement therapy. The current therapy has existing safety and supply issues and requires the consumption of dozens of pills daily, a substantial burden on the patient.

With multiple mid-stage clinical trials in the pipeline, FWBI is positioned to monetize its assets as first-line, second line, or replacement therapies for diseases each representing billions of dollars in market opportunity.

## THE FWBI DIFFERENCE

When one reviews First Wave BioPharma's positioning, the word that jumps out is multiple. Multiple assets, multiple patents, multiple indications, multiple, large underlying markets, multiple potential exits, etc. FWBI as it is constituted today reflects asset acquisitions in segments of the GI market, as outlined above. In our view, the 2H21 acquisition that brought the Company niclosamide (and its corporate name) was misunderstood by the Street. When combined with the general downturn of the biotech market of the past year, it has led to what we believe is a rare and timely entry point offering considerable upside.




*Background*

First Wave BioPharma is a clinical-stage biopharmaceutical company specializing in the development of targeted, non-systemic therapies for gastrointestinal (GI) diseases. The Company is currently advancing a therapeutic development pipeline with multiple clinical stage programs built around its two proprietary technologies – niclosamide, an oral small molecule with anti-viral and anti-inflammatory properties, and the biologic adrulipase, a recombinant lipase enzyme designed to enable the digestion of fats and other nutrients.

First Wave BioPharma's niclosamide portfolio is led by two clinical programs in Phase 2 clinical trials: FW-COV for COVID-19 gastrointestinal infections and FW-UP for ulcerative proctitis (UP) and ulcerative proctosigmoiditis. Three additional indications of niclosamide, include FW-ICI-AC, for Grade 1 and Grade 2 Immune Checkpoint Inhibitor-associated colitis and diarrhea in advanced oncology patients, FW-UC (ulcerative colitis) and FW-CD (Crohn's disease). The Company is also advancing FW-EPI (adrulipase) for the treatment of exocrine pancreatic insufficiency (EPI) in patients with cystic fibrosis and chronic pancreatitis.

The Company boasts a robust IP portfolio of five patents issues and six pending that cover method, formulation and use indications. The awarded patents are secure for 15-20 years.

The executive team has considerable experience and expertise in successfully submitting FDA applications and bringing drugs through the R&D path toward FDA approval. Management is leveraging this expertise to acquire assets that can be developed for use in multiple indications representing large markets. Sellers are paid upfront, and in tranches related to development and future sales. Once certain safety and efficacy data qualitative and quantitative endpoints are confirmed in mid-stage clinical trials, management moves to the monetization phase. Here FWBI seeks out a partner to out-license, receive investment capital, and set up a royalty stream (or revenue share) to be paid upon FDA approval and commencement of sales.

Niclosamide is a perfect example of a drug asset acquired through M&A that offers multiple shots on goal. This prescription small molecule drug is listed as an essential medicine by the World Health Organization (WHO). Niclosamide has been safely used on millions of patients for other clinical indications. In the U.S., niclosamide was approved by the U.S. Food and Drug Administration (FDA) in 1982 for the treatment of intestinal tapeworm infections. In addition to its antihelminthic activity, niclosamide has demonstrated anti-inflammatory and anti-viral properties. The drug's long-standing, clean safety history made for an ideal profile as a GI-targeted agent. Niclosamide has low oral bioavailability with minimal systemic exposure and inhibits pro-inflammatory pathways. It serves as a non-steroidal anti-inflammatory option while offering opportunities for combinations with standard of care for multiple indications without systemic immunosuppression.

Recent discoveries in immune cell metabolism suggest that it is possible to selectively target disease-causing immune cells to treat inflammatory diseases without unwanted side effects such as broad immunosuppression. Research indicates that IBD, including ulcerative colitis, Crohn's disease, and ulcerative proctitis/ proctosigmoiditis, is driven by pathogenic Th17 cells, which release a cascade of local cytokines that in turn cause inflammation in bowel wall tissues.

Niclosamide offers a novel mechanism of action. It is known to disrupt the oxidative phosphorylation in the mitochondria of pathogenic Th17 cells in a manner that selectively induces apoptosis of pathogenic Th17 cells, overcoming their inherent resistance to cell death. By killing Th17 cells, niclosamide reduces inflammation and calms the gut, selectively killing pathogenic, inflammatory cells while leaving healthy cells untouched.

FWBI's suite of proprietary, gut-restricted niclosamide product candidates are designed to target the metabolism of disease-causing Th17 cells to potentially halt or delay the progression of disease, stop flare-ups, and address patient needs at all stages of IBD, from mild to severe, and for cancer patients with checkpoint-induced colitis.

Importantly, the Company has designed a proprietary micronized form of niclosamide, resulting in a transformative treatment for multiple GI indications. FWBI utilizes a reduced particle size (~7 $\mu m$) compared to regular non-micronized (~60 $\mu m$) niclosamide. These smaller particles have a greater surface to solvent (GI fluids) ratio and improved dissolution leading to broader distribution and higher local GI concentrations. Preclinical studies confirm higher GI concentrations (~200x) with micronized niclosamide. Clearly, this method could be replicated for other conditions, gong forward, thereby earning our belief that niclosamide serves as a platform technology asset.

*Leading Off: COVID-19 GI Treatment*

FWBI is developing a proprietary oral immediate-release tablet formulation of niclosamide, FW-COV, as an anti-viral treatment for COVID-19-related GI infections. A Phase 2 clinical trial, RESERVOIR, is investigating the safety of FW-COV and its ability to remove SARS-CoV-2 (SARS2), the virus that causes COVID-19, from the GI tract in patients with acute COVID-19-related GI infections. The Company expects to report top-line data for roughly 150 patients in the first half of 2022. If as we believe, the results will be favorable, it could serve as a catalyst for the Company's stock price. Moreover, depending upon the magnitude of the data that demonstrates the ability to remove the virus from the digestive tract, FWBI could emerge as one of the few companies capable of actually removing the virus from the body via an oral formulation, a potentially highly sought-after formulation.

FW-COV is First Wave BioPharma's proprietary formulation of niclosamide. The formulation has been milled (micronized) to allow superior dissolution in the gut fluids which the Company believes may allow local niclosamide concentrations to reach anti-viral and anti-inflammatory levels. The Company believes that FW-COV has the potential to benefit COVID patients by decreasing viral load in the GI tract, treating infection symptoms, and preventing transmission of the virus through fecal spread.

GI symptoms (severe diarrhea, vomiting and abdominal pain) have been reported in approximately 18% of COVID-19 cases. Of the approximately 80 million individuals who are reported to have contracted COVID-19 in the U.S., this would translate into over 14 million patients having GI infection. Furthermore, approximately 10% of patients who were infected with COVID have persistent symptoms months after their initial diagnosis. Approximately 86% of these COVID "long haulers" are reported to have GI infection symptoms, with 60% continuing to have diarrhea months after their initial infection.

RESERVOIR is designed as a two-part, two-arm, randomized, placebo-controlled Phase 2 study with a primary purpose to confirm the safety of FW-COV and assess the drug's ability to remove the SARS-CoV-2 (SARS2) virus from the digestive tract. Patients enrolled in Part 2 of the study were to be chosen randomly to receive either niclosamide or a placebo. After 14 days, patients will cease treatment but remain under observation for up to six weeks. The efficacy of FW-COV will be measured by the rate of SARS2 clearance from stool samples assessed by PCR test, comparing the niclosamide arm and the control arm. Six months long-term observation could indicate whether niclosamide treatment has the potential to improve "long haul" COVID-19 symptoms.

An urgent need exists to develop new medicines that can be manufactured at a large scale quickly to treat COVID-19 and long haul COVID-19 and the related conditions that linger. It is common practice for biopharma companies to release top-line data as a catalyst to engage in substantive discussions with potential development and investment partners. Thus, we believe it makes sense that a deal could be struck with FWBI and a large pharma player with major exposure to the COVID-19 market such as Pfizer or Merck or a similar company. Separately, we assume management would file for an Emergency Use Authorization (EUA) for the drug, making an opportunity for a third party even more attractive. Plus, it could mean the niclosamide for this indication could be monetized in late 2022 or early 2023.

It is difficult to project the cost to design and commence a future Phase 3 trial, or what the parameters a potential deal structure and pricing model would look like in this scenario. Still, considering the billions Big Pharma stands to make on COVID-19 treatment options, we can assume that niclosamide in this indication could result in thousands per patient in royalties or a revenue share arrangement for FWBI. The length of time the drug would be prescribed and the order of magnitude to which it is prescribed will likely be determined by the larger partner. As a result, we expect to have more clarity in the coming months and can adjust our forecasts at that time. (Our current forecasts can be found in the Financials section.)

*Traditional IBD Pipeline*

While the COVID-19 treatment opportunity is exciting, it may not have the shelf life of traditional IBD treatments on a long-term basis. In October 2021, FWBI dosed the first patient in a Phase 2b clinical trial investigating a topical formulation of niclosamide (FW-UP) as a potential treatment for patients with ulcerative proctitis (UP) and ulcerative proctosigmoiditis (UPS). The trial formally launched the expansion of the Company's clinical development program for niclosamide into indications for inflammatory bowel diseases.

As outlined below, the UP/UPS trials reflect the first use of niclosamide as an anti-inflammatory therapeutic to treat IBD and UP/UPS. This is significant for a few reasons. One interesting point is that it reflects one tenet of the Company's treatments is quality of life. For example, with some UC and UP diseases, treatment is administered rectally. In contrast, FWBI seeks to utilize an oral micronized tablet pathway or in some cases a topical solution. Currently, management is largely targeting those patients with mild/moderate symptoms and who have not demonstrated a favorable response to the first-line therapy. Given the quality-of-life model along with positioning as a second-line therapy, we believe that FWBI can achieve clinical and monetization success in multiple IBD indications.

Given niclosamide's known safety profile, it is possible that the drug could reduce or eliminate entirely the need of steroids and immunosuppressants. The Phase 2b trial is a placebo-controlled study that will enroll up to 28 patients to compare FW-UP, administered as an enema twice daily at a dose of 450 mg, to placebo enemas twice daily. Patient screening is underway at clinical trial sites in Italy and will start soon in Austria and Germany. First Wave BioPharma is also planning a separate clinical trial to investigate an oral formulation of niclosamide as a potential treatment for pancolitis.

The Phase 2b trial builds on preliminary data from a previous Phase 1b trial evaluating a low-dose (150 mg/twice daily) and a Phase 2a high-dose (450 mg/twice daily) of FW-UP in patients with UP and UPS. Data from the first 17 patients treated in the low-dose cohort demonstrated niclosamide to be well tolerated, with a durable

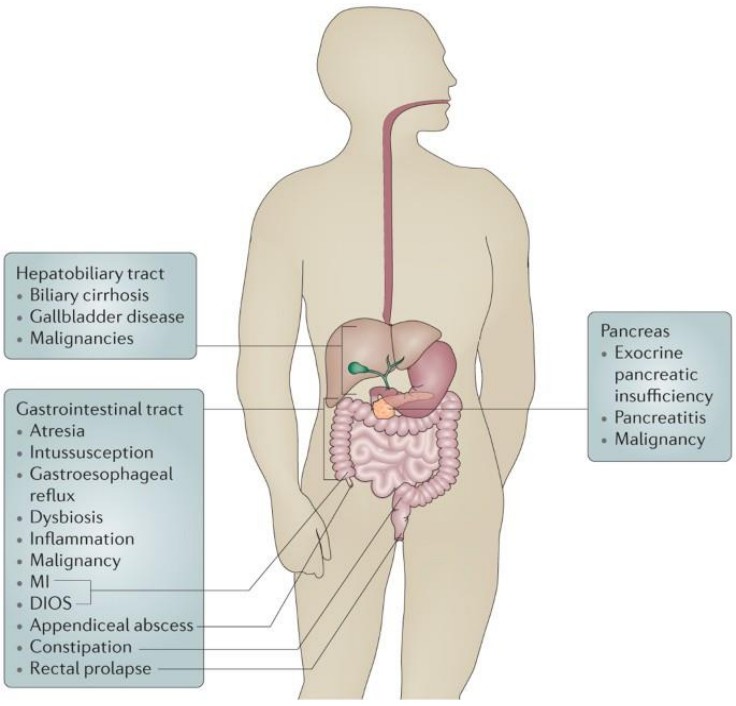
therapeutic effect and a clinical remission rate of 59%. Although these initial trial results are based upon early-stage data, this rate of remission compares favorably to the rates of 38% to 44% reported for the commonly used steroid, budesonide. In data collected from the first four patients in the high-dose cohort, niclosamide was also shown to be well tolerated.

FWBI received an IND clearance letter from the FDA for its Phase 2a PASSPORT clinical trial in late 2021. This trial is designed as a double-blind, placebo-controlled study to determine the safety, tolerability, and preliminary efficacy of FW-ICI-AC, a micronized oral formulation of niclosamide, in the treatment of immune checkpoint inhibitor-associated colitis (ICI-AC) and diarrhea in advanced cancer patients. 60 patients will be enrolled in the trial and divided into two arms (30 patients per arm). One arm will receive FW-ICI-AC three times daily for two weeks, while the other arm will receive placebo three times daily for two weeks. Following treatment, each patient will enter a four-week evaluation period. The primary endpoint of the trial is safety and tolerability of FW-ICI-AC. Additional endpoints will measure early signals of efficacy, including resolution of the patient's diarrhea, sparing of steroids, and prevention of disease progression.

As many as 30 percent of cancer patients treated with checkpoint inhibitors develop diarrhea that can progress to colitis, a condition that can be debilitating and, at times, life-threatening due to the compromised health of the patient and the impact if patients are forced to halt their cancer treatment. niclosamide has the potential to be the first drug specifically for early-stage Grade 1 and Grade 2 ICI-AC.

*Cystic Fibrosis*

Adrulipase is a recombinant lipase enzyme derived from the *Yarrowia lipolytica* yeast that FWBI is developing for the treatment of exocrine pancreatic insufficiency (EPI) associated with cystic fibrosis and chronic pancreatitis. In early 2022, the Company filed two new provisional patent applications pertaining to adrulipase with the U.S. Patent and Trademark Office (USPTO). The first application is directed to new lipase dosage forms, methods of treatment and methods of manufacturing. The Company anticipates using these dosage forms in a Phase 2b monotherapy trial in 2H 2022. The second, application expands the potential indications for adrulipase to new patient populations based on adrulipase's potential to improve the nutritional status of individuals who may benefit from additional absorption of nutrients. FWBI seeks to develop the drug as a potential treatment for EPI that could improve upon the current standard of care, porcine-derived pancreatic enzyme replacement therapy (PERT).



FWBI is pursuing parallel monotherapy (FW-EPI) and combination therapy clinical pathways with adrulipase (FW-EPI+PERT). The Company reported topline results in 2021 from two Phase 2 clinical trials. The new oral enteric microgranule formulation of adrulipase, now in development, is planned to be administered with food as a capsule that dissolves in the stomach and disperses acid-resistant micro-granules that thoroughly mix with food during the digestion process. The resultant mixture then passes to the small intestine where the lipase enzyme breaks up fat molecules so that they can be absorbed. The Company expects to complete the formulation work in the first half of 2022 and to initiate a Phase 2b monotherapy trial during the second half of 2022.

EPI affects the pancreas by hindering the body's ability to digest food. According to data provided by FWBI, 30,000 cystic fibrosis patients suffer from EPI and severe EPI and an estimated 90,000 chronic pancreatitis in the US have EPI. This $2 billion global market is yearning for a favorable solution that would serve as an alternative to the current porcine enzyme replacement therapy. The current therapy has existing safety and supply issues and requires the consumption of 25-40 pills daily, a substantial burden on the patient. Adrulipase would require just a handful of pills - currently estimated at 5-8 capsules per day.

Looking ahead, we foresee a series of licensing events occurring in the months following the release of top-line data for the current Phase 2 programs and future asset acquisitions to close over the next 12 months as well.

## FIRST WAVE BIOPHARMA EXECUTIVE TEAM

FWBI is led by a diverse, highly experienced team in life sciences arena and capital markets, whose members boast an enviable history of exits, and successful NDA (New Drug Application) and BLA (Biologics License Application) submissions with the FDA. We maintain that this executive team may rival mid-cap sized peers and is poised to lead the Company to the successful development and monetization of its leading candidates for multiple indications.

**James Sapirstein, Chairman, President, Chief Executive Officer**

James Sapirstein has served for over thirty-seven years in the pharmaceutical industry. He is currently the Chairman, CEO and President of **First Wave BioPharma (NASDAQ: FWBI)**.

He began his career in 1984 with Eli Lilly, moving to Hoffmann-LaRoche in 1987, where he served for almost a decade on various commercial teams in the US and Internationally. He joined Bristol Myers Squibb as the Director of International Marketing in the Infectious Diseases group in 1996. While at BMS, he worked on several important HIV/AIDS projects including Secure the Future.

Mr. Sapirstein started his career in smaller biotech companies when he later joined Gilead Sciences, Inc. (GILD) in order to lead the Global Marketing team in its launch of Viread (tenofovir). In 2002, he accepted the position of Executive Vice President, Metabolic and Endocrinology, for Serono Laboratories. Later, in 2006, he became the founding CEO of Tobira Therapeutics, then a private company. Tobira Therapeutics was acquired by Allergan in 2016. In 2012, Mr. Sapirstein became the CEO of Alliqua, Inc. Thereafter, he served as CEO of Contravir Pharmaceuticals from March 2014 until October 2018. All of these are publicly listed companies. Mr. Sapirstein has raised over $300 Million dollars in venture capital and public capital markets financing in his various

engagements as CEO. He was named as a Finalist for the Ernst&Young Entrepreneur of the Year award in 2015 as well as in 2016.

Mr. Sapirstein holds board positions on **Enochian Biosciences (ENOB:NASDAQ)**, and **Blue Water Acquisition SPAC (BLUWU:NASDAQ)**. He was Chairman of the Board for BioNJ, an association of biopharma industries in New Jersey from Feb 2017-Feb 2019. In addition, he is a Board Director for BIO (Biotechnology Innovation Organization), the leading biotechnology trade organization promoting public policy and networking in the healthcare space, where he sits on the Emerging Companies Section Governing Board.

Mr. Sapirstein received a BS (Pharmacy) from Rutgers University in 1984 and an MBA from Fairleigh Dickinson University in 1997.

**Dr. James Pennington, M.D., Chief Medical Officer**

Previous to joining First Wave BioPharma, Dr. Pennington spent eleven years at Anthera Pharmaceuticals as Chief Medical Officer and Senior Clinical Fellow. Prior that, he has held senior medical positions in a number of biopharmaceutical companies, including InterMune, Cotherix, and Bayer Pharmaceutical. Dr. Pennington has led registration efforts for twelve successful BLA/NDA submissions in the U.S. and another ten in Europe and Asia. Prior to joining the biotech industry, Dr. Pennington spent ten years on the Medical Faculty of Harvard Medical School. Dr. Pennington received his medical degree from the University of Oregon Health Sciences University and is boarded in internal medicine and infectious diseases.

**Sarah Romano, Chief Financial Officer**

Sarah Romano, CPA, was appointed as Chief Financial Officer of First Wave BioPharma in March 2022. She previously served as Chief Financial Officer of **Kiora Pharmaceuticals, Inc. (NASDAQ: KPRX)** (formerly EyeGate Pharmaceuticals, Inc.), a clinical-stage specialty pharmaceutical company developing products for treating ophthalmic diseases, from February 2017 through February 2022 and as its Corporate Controller from August 2016 to January 2017. Prior to joining Kiora, Ms. Romano served as Assistant Controller at TechTarget from June 2015 through August 2016 and Corporate Controller at Bowdoin Group, a healthcare-focused executive recruiting firm, from September 2013 through May 2015. Previously, she held financial reporting positions of increasing responsibility at SoundBite Communications from 2008 until its acquisition by Genesys in 2013, and at Cognex Corporation from 2004 through 2008. Ms. Romano began her career as an Auditor in the Boston office of PricewaterhouseCoopers. A licensed CPA in Massachusetts, she holds a Bachelor of Arts in Accounting from College of the Holy Cross and a Master of Accounting from Boston College.

**Martin Krusin, Senior Vice-President, Corporate Development**

Mr. Krusin is an experienced executive with over 20 years of business development, strategic marketing, financing and operating experience in the healthcare, financial services, and consulting sectors. Prior to joining First Wave BioPharma as VP for Business Development in 2014, Mr. Krusin was VP for BD at FluoroPharma Medical, Inc.; Director of Business Development at Clewed (a business services and investment partnership); an Experienced Commercial Leader at GE Capital in its Global Sponsor Finance, Healthcare Financial Services, and Capital Solutions units; Vice President of Marketing & Sales and Director of Business Development at

Electro-Optical Sciences (MelaSciences); and an analyst in the Emerging Markets Strategic Planning Group at Citigroup. He has also served as a mentor, business coach and head of coaching to over 20 life-science starts-ups, spanning therapeutics, diagnostics, medical devices, healthcare IT, and biomaterials, in the ELab NYC EDC entrepreneurship program from 2016 to the present. Mr. Krusin received an MBA from Columbia Business School in finance and marketing, an MPhil. in political economy from Oxford University, and a BA in international relations from Swarthmore College.

**Ted Stover, Vice-President, Product Development**

Mr. Stover joined First Wave BioPharma in 2020 as the Product Development Director to oversee CMC and Project Management. Prior to joining First Wave BioPharma, Mr. Stover spent 20 years focused on manufacturing operations and analytical method development to support all stages of pharmaceutical drug development. Most recently Mr. Stover served as the Senior Director of Program Management for Biorasi after holding positions of Vice President Manufacturing at SCI and Operations Manager for Prioria Robotics. Mr. Stover earned his MBA from the University of Florida.

**Dr. Dinesh Srinivasan, PhD., Vice-President, Translational Research**

Dr. Srinivasan has over 15 years of leadership experience in drug discovery and development in the pharmaceutical industry. He previously was Director, Scientific BD at Anthera Pharmaceuticals Inc., where he wore multiple hats including program management and translational sciences to support the ongoing clinical development programs. He began his career in industry as a post-doctoral fellow at Roche Palo Alto and worked in drug discovery as Scientist/Senior Scientist/Group Leader at Roche in Palo Alto and Nutley, NJ. Dr. Srinivasan received his MSc in Biotechnology from The University of Mumbai, India and a PhD In Pharmacology & Toxicology from the University of Arizona, Tucson.

## FINANCIALS SNAPSHOT

As a non-revenue generating company there is not a great deal of line-item forecasting, with the exception of operating expenses such as R&D and G&A. Our P&L forecasts can be found at the end of the report, subject to updating later this spring. We did not include a balance sheet at this time as we look forward to the filing of a more current one reflective of the Company's recent $9 million gross proceeds funding. The Company had roughly $7 million in cash as of the November 2021 filing, from which our 2021 and 2022 estimates are based. We believe that once a royalty deal is secured, management may seek to close another M&A transaction, which could be largely similar to the 2H21 FWBI terms.

"On September 13, 2021, the Company announced the acquisition of FWB and paid FWB an upfront cash payment of $3 million and issued $4 million of common stock. The original remaining upfront consideration of $15 million ($8 million due on October 28, 2021 and $7 million due March 31, 2022) has been restructured. Under the Revised Merger Agreement, this $15 million amount will be paid in smaller monthly installments commencing in January 2022 through mid-year 2023, until satisfied."

In our view, there are a few key items to monitor:

- Balance sheet and opex as of the end of 1Q22 and associated burn rate
- Share count including exercised warrants
- Timing of potential licensing deal for FW-COV
- Royalty terms and potential sales

Our current forecasts for 2021 assume a net loss of roughly ($86,000) with ($59,700) coming from operating expenses and the balance from items below the operating line. For 2022, we project $1.1 million in royalty revenue attributed to FW-COV, as we outlined above. Our $50 million in royalties for 2023 primarily reflect royalties and/or revenue share attributed to FW-COV and a small amount for FW-UP as well. We project a 22% operating margin and $0.40 in EPS using an estimated weighted shares outstanding figure.

The order of magnitude of the revenue will be dependent upon the terms, regimen length, and market penetration. Our preliminary forecast assumes royalties in the hundreds of dollars per patient, per treatment regimen. We believe these figures to be conservative and could track considerably higher for FW-COV. According to our model, 2022 represents the first revenue year, with 2024 enjoying hockey-stick type growth, reflecting an active, multi-product royalty portfolio.

*Valuation/Price Target*

We have elected to establish a valuation and price target based on the Net Present Value of a 5x operating income multiple achieved in ten years (2031) and discounted back at rate of 15%. We modeled operating income of revenue of $228 million and arrived at a present value of $568 million. By using the fully diluted 35.7 million shares outstanding figure, we arrive at an NPV, or price target of $16. Given the bright future and additional potential indications with adrulipase, upside to our NPV exists, an opportunity we will explore later this year.

## RISK FACTORS

In our view, the Company's biggest risks are related to the successful development of its two leading candidates, Niclosamide and Adrulipase. Current risks include the generation of statistically significant and materially favorable clinical study and trial results, relative to endpoints and peer data. A related risk along this path includes the subsequent monetization via out licensing or other deals to third party partners of any or all of the indications currently being developed and tested by the Company.

Given the history of the drugs, we maintain that the safety profile of FWBI's portfolio is likely comparable or superior to existing approved therapies and those under development by competitors. However, there could be issues with future trials, such as requests for additional data by the FDA. Even if an approval is granted, pricing or marketing by competitors could impede sales and market share growth. A key non-product developmental risk is the access to appropriate capital and funding on favorable terms for future clinical trials and studies for current and future indications. Separately, FWBI may not have access to capital in the future to continue its M&A asset strategy in which management is able to acquire potentially monetizable assets that could serve an unmet medical need representing billion-dollar markets.

The aforementioned risks are consistent with firms of FWBI's size and standing. Moreover, we believe that FWBI's seasoned management team is prepared to overcome these hurdles and generate significant top-line growth developmental success, going forward.

Volatility and liquidity are typical concerns for microcap stocks, particularly unprofitable, non-revenue-generating firms. Still, an overriding financial benefit as a public company is the favorable access to and the availability of capital to fund R&D, M&A, and other initiatives which could lead to future monetization. In our view, the proceeds of any future funding would be used in large part to advance business development such as M&A, and R&D which may led to product out-licensing by indication, royalty streams, and potential co-investment with a JV partner. Moreover, business development could lead to the receipt of potential partner revenue sharing upon FDA approval and product sales commencement. As a result, we believe that any dilutive effect from such a funding could be offset by related future increases in market value.

## CONCLUSION

Driven by upcoming milestones, we believe FWBI is set to enjoy a rise in its share price. FWBI is slated to publish top-line clinical results for its Phase 2 COVID-19 GI trial in 1H22. We believe results will be favorable and attract a licensing partner in the form of Big Pharma, leading to potential first royalties later this year. The Company boasts 2 key assets, 6 indications, and 4 Phase 2 clinical programs, along with a novel, proprietary micronized formulation. Management has a history of exits and successful product development. We believe FWBI will enjoy similar success.

Management's strategy is to acquire assets for development and out-licensing that represent multi-billion-dollar indications and unmet needs. A core tenet is improving outcomes and quality of life such as producing oral formulations versus other, painfully administered drugs. FWBI has a series of trials slated to commence or be prepared for top-line results in 2H22 and through 2023. These include multi-billion-dollar IBD-related trials and other GI indications.

We project FWBI could generate more than $1M in royalties in 2022 and $50M in 2023, whereby it may achieve a 22% operating margin. Our $16 price target reflects the Net Present Value of a multiple on FWBI's future operating income, discounted back by 15% per annum. This target is a modest premium to its 52-week high.

**Table I. First Wave BioPharma, Inc.**
Pro Forma Income Statement
($,000)

| | FY21E | FY22E | FY23E |
|---|---|---|---|
| **ROYALTY REVENUE** | **$0** | **$1,100** | **$50,000** |
| Research and development | $39,500 | $19,000 | $20,000 |
| General and administrative | $20,200 | $18,000 | $19,000 |
| **Total Operating Expenses** | **$59,700** | **$37,000** | **$39,000** |
| **Operating Income (Loss)** | **($59,700)** | **($33,000)** | **$11,000** |
| *Operating Income Margin* | *N/A* | *N/A* | *22.0%* |
| Interest expense | ($11) | ($20) | ($100) |
| Other income | $1 | $0 | $0 |
| Total Other Income (Expense) | $0 | $0 | $0 |
| Change in FV of Liability | $600 | $500 | |
| For curr transl adj | ($200) | ($200) | **$0** |
| Total comprehensive Loss | ($60,090) | ($32,780) | $10,900 |
| Deemed div pref stock | ($4,507) | | |
| Deemd div pref stock exch | ($21,008) | | |
| Pref stock div | ($349) | | |
| **Net Income (Loss)** | **($85,954)** | **($33,280)** | **$10,900** |
| **Current Earnings Per Share** | **($9.66)** | **($1.75)** | **$0.40** |
| Est. Wtd. Shares Outstanding | 8,900 | 19,000 | 27,000 |

Sources: FWBI, SEC Filings, and Goldman Small Cap Research

## RECENT TRADING HISTORY FOR FWBI

(Source: www.StockCharts.com)

## SENIOR ANALYST: ROBERT GOLDMAN

Rob Goldman founded Goldman Small Cap Research in 2009 and has over 25 years of investment and company research experience as a senior research analyst and as a portfolio and mutual fund manager. During his tenure as a sell side analyst, Rob was a senior member of Piper Jaffray's Technology and Communications teams. Prior to joining Piper, Rob led Josephthal & Co.'s Washington-based Emerging Growth Research Group. In addition to his sell-side experience Rob served as Chief Investment Officer of a boutique investment management firm and Blue and White Investment Management, where he managed Small Cap Growth portfolios and *The Blue and White Fund*.

## ANALYST CERTIFICATION

I, Robert Goldman, hereby certify that the view expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the recommendations or views expressed in this research report.

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