DAWSONJAMES SECURITIES

Member FINRA/SIPC

INSTITUTIONAL RESEARCH

Biotechnology

INITIATION REPORT

Toll-Free: 561-391-5555 ♦ www.DawsonJames.com ♦ 1 North Federal Highway - Suite 500 ♦ Boca Raton, FL 33432

Jaguar (NASDAQ/JAGX)

January 3, 2019

BUY It's Time for a Natural Solution

Jason H. Kolbert
Head of Healthcare Research
646-465-6891
jkolbert@dawsonjames.com

It's time for a natural solution. Crofelemer, brand name Mytesi, is a natural product derived from an abundant source, the Corton lechleri tree. It treats diarrhea at its source by normalizing secretion of water into the gut. Mytesi is the only FDA approved antisecretory diarrhea treatment on the market today.

Investment Highlights

Mytesi revenues are starting to build, reflecting Jaguar's focused product launch efforts. Chronic diarrhea is a common side-effect of HIV therapy and annually impacts greater than 250,000 people in the U.S. Jaguar is looking to address this population with a new salesforce that is now actively promoting the drug. Sales growth since promotion efforts began in 2017 looks favorable. We estimate Mytesi could reach $4.4M in revenues this year, $15.7M in 2019, and $28.7M in 2020, driving the company to break-even. We estimate that by 2028 Mytesi in HIV alone can reach $76M in revenues, which would represent less than 10% of the total HIV market. We see the potential for Mytesi to be a big drug, not just in HIV chronic diarrhea, but in multiple other markets such as cancer therapy diarrhea (CTD), irritable bowel syndrome (IBS), short bowel syndrome (SBS), and congenital diarrheal disorder (CDD). Like many micro-capitalized emerging growth companies, raising capital has been challenging. On a positive note Jaguar successfully completed a $9M capital raise in September 2018. The raise was anchored by a corporate partner (Knight Therapeutics; TSX: GUD; not rated) which acquired distribution, licensing, and supply rights in Canada and Israel. We estimate that Jaguar ended the year with close to $6.3M in cash. This should be enough capital, depending on top-line revenues, to support operations for the next year. We view the weakness in the stock as an artifact of the company's capital raises and as such an opportunity as Mytesi fundamentals appear solid. We are therefore initiating coverage of Jaguar with a Buy rating and a $1 price target.

It's time for a natural solution. Crofelemer, brand name Mytesi, is a natural product derived from an abundant source, the Croton lechleri tree. It treats diarrhea at its source by normalizing secretion of water into the gut. Mytesi is the only FDA approved antisecretory diarrhea treatment on the market today. The initial indication is for HIV-associated noninfectious diarrhea, but plans are underway to expand the label for CTD followed by additional indications in areas like IBS and IBD. In CTD, two investigator-led studies, one supported by Genentech, a division of Roche (RHHBY; not rated), now underway, and a second study, sponsored by Puma Biotechnology (PBYI; not rated), still in the planning stage, are being designed to evaluate the effects of crofelemer to mitigate the diarrhea which causes patients to terminate their therapy course early. These market segments represent greater than 500K possible patients translating into an estimated $1B market opportunity. As Jaguar is not the sponsor, timing of data is uncertain, though we may see some data by 1Q19. We believe good data could help attract a corporate partner which could pay our estimated $12.6M in expenses for the company to run a Phase 2, Proof of Concept (POC) study.

Current Price	**$0.28**
Price Target	**$1.00**

Estimates	F2017A	F2018E	F2019E
Revenues ($000s)	$ 4,361	$ 4,620	$ 16,054
1Q March	$ 822	$ 804	$ 2,482
2Q June	$ 897	$ 884	$ 3,085
3Q September	$ 1,100	$ 1,132	$ 4,542
4Q December	$ 1,542	$ 1,800	$ 5,946
	F2017A	F2018E	F2019E
EPS (diluted)	$ (0.66)	$ (1.80)	$ (0.09)
1Q March	$ (0.33)	$ (0.78)	$ (0.05)
2Q June	$ (0.12)	$ (0.44)	$ (0.03)
3Q September	$ 0.07	$ (0.51)	$ (0.01)
4Q December	$ (0.27)	$ (0.07)	$ 0.00
EBITDA/Share	($0.79)	($1.15)	($0.08)
EV/EBITDA (x)	9	10	139

Stock Data	
52-Week Range	$0.12 - $6.60
Shares Outstanding (mil.)	24.6
Market Capitalization (mil.)	$7
Enterprise Value (mil.)	$11
Debt to Capital	155%
Book Value/Share	$2.46
Price/Book	0.9
Average Three Months Trading Volume (K)	4,270
Insider Ownership	35.3%
Institutional Ownership	13.3%
Short interest (mil.)	2.2%
Dividend / Yield	$0.00/0.0%

Initiation - January 3, 2019 - Buy - Price Target $1.0

Unlock Mytesi's potential. Mytesi was launched in late 2016 by Napo Pharmaceuticals, which in July 2017 became a wholly owned subsidiary of Jaguar Health. Capital constraints of both Napo initially and later Jaguar restrained the commercial launch. Today, Jaguar has a dedicated salesforce of 15 representatives and in June 2018, entered into a co-promote agreement for Mytesi with RedHill Biopharma. Sales trends are showing growth with 1Q18 revenues of $627K, 2Q18 revenues of $884K, and 3Q18 revenues of $1.1M.

RedHill is now working with Jaguar to promote Mytesi. Under the terms of the agreement with RedHill, that company's specialized, GI-focused U.S. field salesforce numbering 36 salesmen, plans to promote Mytesi to healthcare practitioners in 38 territories within the U.S. that contain significant numbers of HIV patients and healthcare practitioners that are not currently covered by Napo's field salesforce. RedHill field representatives plan to target lower-decile infectious disease specialists in regions currently covered by Jaguar's salesforce. In addition to these efforts four internal (telephone marketing) RedHill sales representatives plan to actively target healthcare practitioners in other regions not covered by Jaguar or other RedHill field representatives. We see the co-promotion as synergistic to Jaguar's own efforts and believe that building awareness and achieving critical mass is important at this early stage of the launch of a new product in a competitive market environment. Based on our conversations with management we assume Jaguar captures between 85-90% of all related revenues that RedHill generates.

A unique MOA, treating diarrhea at the source. Crofelemer's mechanism of action separates it from other diarrhea treatments available on the market. As an antisecretory, it normalizes the secretion of chloride ions, and subsequently water, into the intestinal lumen, while the only other options on the market are either adsorbents like Pepto-Bismol or antimotility drugs like Imodium and more restrictive options like tincture of opium that may not be appropriate for chronic treatment. Crofelemer acts locally in the gut to block calcium-activated chloride channel anoctamin-1 (CaCC) and the cystic fibrosis transmembrane conductance regulator (CFTR) chloride channels with a maximum inhibition of 90% and 60%, respectively. By blocking these channels, the concentration of calcium ions in the gut is reduced, which normalizes the secretion of sodium ions and water. Crofelemer is selective for these two channels and is not absorbed into the bloodstream as such crofelemer is excreted (not metabolized).

Beyond HIV: Multiple indications such as CTD, IBS, IBD, SBS, and CDD. Over time, Jaguar plans to expand Mytesi's label with new indications, the most significant of which is for CTD, which is a large market. We model 436K potential Mytesi patients. Two investigator sponsored trials are using crofelemer, one at Georgetown University sponsored by Genentech, a subsidiary of Roche, and one at UCSF sponsored by Puma Biotechnology, which has just begun. We may see data in 1Q-19 from the Georgetown study. As both these trials are investigator run, timing for start or data is uncertain. Beyond CTD, and with a partner who can pay the development costs and bring in up-front capital, there are also indications of IBS and inflammatory bowel disease (IBD) and idiopathic diarrhea. Two interesting indications which may represent a shorter development time to the market are the orphan indications of CDD and SBS. We expect Jaguar to develop a modified formulation of crofelemer, specific to the indication and priced at a premium. Jaguar is also developing a second-generation product, SB-300 for cholera. The cholera indication could result in the company being granted a Priority Review Voucher (PRV) which can be sold in the marketplace. PRV's values range but they have been previously sold for greater than $100M in revenue. As SB-300 is still in the planning stages, we do not include any valuation for it in our model, although we are aware that the company has completed GMP manufacturing of the API. **Not just people, animals too.** Before the merger with Napo, Jaguar was focused on animal health. The company has several products still being commercialized today and is completing the final stages of some additional crofelemer-related products for animals including dogs, calves, and race horses. We model very modest revenues for these products as the focus now is on the human indications. With that said, we believe in future years, with additional resources, the company could build out its animal health platform.

Valuation. We model revenues for Mytesi in HIV-related diarrhea followed by CTD in 2021. We apply a 30% probability of success in the CTD indication as the company lacks the capital to fund the required pivotal trial today. Therapeutically, given Mytesi's approval in HIV and with results of one investigator sponsored trial in CTD pending, and a second set to begin next year, we believe the probability of success independent of finances is closer to 70%. We assume no other significant revenues at this time as the company has limited financial resources. Our model also assumes additional dilution associated with capital raises before Jaguar becomes profitable. We believe management is sensitive to dilution concerns and is pursuing business development options as a way to bring capital into the company. We estimate the company has approximately $6.3M in cash today and 33.5M (fully diluted) shares outstanding. We assume a fully diluted out-year share count of 60.7M by 2028. For profitable companies with positive free cash flow and a high degree of visibility around earnings, we typically use a 10% discount rate, for companies that are still in clinical development stages with no approved products we use a 30% discount rate. As Mytesi launches, Jaguar qualifies as a commercial company, but one with capital constraints which could push break-even out a few years. As such, we use a projected 15% WACC with an added discount measure of 15%, based on the early nature of Mytesi as a new product in a new indication for a combined discount rate of 30%. We then apply this to our free cash flow, discounted-EPS, and sum-of-the-parts models, which are equally weighted and rounded to derive a 12-month price target of $1.00. **Risks to our thesis include the following:** (1) commercial; (2) clinical; (3) regulatory; (4) financial; (5) intellectual property; and (6) manufacturing. We review these and other risks in the risk section of this report.

Company Overview

Jaguar Health is a natural-products pharmaceuticals company focused on the development and commercialization of novel, sustainably-derived gastrointestinal products primarily for human prescriptions use, although the company's origins are in animal health. In July 2017, Jaguar merged with Napo Pharmaceuticals in an all-stock transaction, and Napo became a wholly-owned subsidiary of Jaguar. Jaguar Animal Health, Inc. was originally founded in June 2013. Napo, originally Shaman Pharma, was founded in March 1989. Jaguar today is based in San Francisco. The company's lead product is Mytesi (crofelemer). It is FDA approved for the symptomatic relief of noninfectious diarrhea in adults with HIV/AIDS on antiretroviral therapy. The company is pursuing a follow-on indication for Mytesi in cancer therapy diarrhea (CTD), an important supportive care indication for patients undergoing primary or adjuvant therapy, which could be biologic targeted therapy, traditional chemotherapy, radiation, or a combination of therapies, all for cancer treatment. Mytesi is also in development for the orphan drug indication for infants and children with congenital diarrheal disorders (CDD) and short bowel syndrome (SBS). A second-generation antisecretory agent, SB-300 is in development for use in cholera patients. Additional indications in the pipeline include irritable bowel syndrome (IBS) and supportive care for inflammatory bowel disease (IBD) and idiopathic diarrhea. In the animal health space, Jaguar continues to support some legacy products and completed the development of Canalevia filing (Napo in 2019), in dogs and supports Equileva in high-value horses.

So, how did the merger with Napo happen? Crofelemer is the active pharmaceutical ingredient in Canalevia, Jaguar's prescription drug product for companion animals, which is being evaluated for the treatment of chemotherapy-induced diarrhea (CID) in canines. Diarrhea is one of the most common reasons for veterinary office visits for dogs, and according to the American Veterinary Medical Association, there are approximately 70 million dogs in the U.S. Given the commonality of crofelemer, Jaguar saw the opportunity to bring resources to Napo and build out the commercial opportunity in the ethical pharmaceuticals market. The company's goals today are to focus resources on the launch of Mytesi in HIV and advance the development of the CTD indication, advance BD deals to bring in both capital and resources to develop the IBD and IBS indications, develop CDD/SBS orphan indications, and advance the next-generation product SB-300 for cholera with an eye towards winning a Priority Review Voucher (PRV).

Mytesi in our opinion could be a significant product, and Jaguar's pipeline appears to represent multiple development opportunities for both new indications and second-generation products. As such, why is the market capitalization of the company so small at approximately $10-15 million? In our opinion, two reasons stand out. First, the company was originally founded around animal medicine with an emphasis on canines, bovines, and high-value equines. Pricing information for therapies in these markets is limited. Second, the company has been capital constrained. Financing at the time of the merger with Napo (summer 2017), raised just $4.2 million leaving the company under-funded and in our opinion, its equity depressed. Subsequent financings include $16 million raised in March 2018, and this past September, $7.3 million (net). We estimate Jaguar has enough capital into 2H19 and runway to build Mytesi sales next year (we estimate Mytesi could reach $15 million in 2019, allowing the company to approach break-even). We know management is sensitive to dilution and looking for regional deals for Mytesi that can bring in upfront capital and extend the operating runway too. In our opinion, as Mytesi's revenues build it should allow the company to become cash flow positive which in turn should help to unlock its valuation, allowing Jaguar to raise additional capital needed to expand Mytesi's indications as well as develop the pipeline.

Exhibit 1. A Product That Represents a Pipeline

	Preclinical	Phase 1	Phase 2	Phase 3	NDA	Near-Term Milestones	Market Size/Potential
HIV-D *Diarrhea in HIV/AIDS patients on antiretrovirals*						Seeking inclusion on World Health Organization (WHO) Essential Medicines List	Jaguar estimates the U.S. market revenue potential for Mytesi® to be ~$100mm in gross annual sales; Jaguar is seeking partnerships to bring Mytesi to emerging markets and rest of world®
CTD *Cancer therapy-related diarrhea*						Ongoing II Trials; SAB Protocol Design	~650,000 U.S. cancer patients receive chemotherapy in an outpatient oncology clinic.[2] Comparable supportive care (i.e. CINV) product sales ~$620 mm, 2013; projected $1.0 bn 2020[3]
IBD *Inflammatory bowel disease supportive care*						SAB protocol design	Estimated 1,171,000 Americans have IBD[4]
IBS-D *Irritable Bowel Syndrome - diarrhea predominant*						Partner discussions	Most IBS products have estimated revenue potential >$1.0 bn[5]
CDD/SBS-Orphan *Congenital Diarrheal Disorders and Short Bowel Syndrome*						Formulation / POC Abu Dhabi/SAB Protocol Design	Financial benefits of Orphan Designation
Cholera (hydration maintenance) PRV (SB-300) *Offer long-term pipeline opportunity for anti-secretory novel mechanism of action*						Formulation / POC	Priority review vouchers have recently sold for $125mm to $350mm[6]

Source: Jaguar Health.

Exhibit 2. Catalysts

Product	Geography	Indication	Event	Timeline	Impact
Mytesi	US	Cancer therapy diarrhea	Phase 2 data, investigator sponsored study	In Progress	
Mytesi	US	Cancer therapy diarrhea	HALT-D Study - Interim Analysis	1Q19	+
Mytesi	US	Cancer therapy diarrhea	UCSF Sponsored study to begin	1H19	+
Mytesi	US	Cancer therapy diarrhea	Initiate Phase 2/3 adaptive design trial under SPA	1Q19	+
Mytesi	US	Cancer therapy diarrhea	Phase 2/3 top line data	1Q20	+++
Mytesi	US	Cancer therapy diarrhea	Phase 2/3 data, file sNDA	1H20	+
Mytesi	US	Cancer therapy diarrhea	Label Revision Approval and Commercialization	1H21	+++
SB-300	India	Cholera	Initiate Phase 1/2 study	2H18	+
SB-300	India	Cholera	Phase 1/2 data	1H19	++
SB-300	India	Cholera	File NDA	2019	+++
SB-300	India	Cholera	Voucher	2020	+++
Mytesi	US	Short bowel syndrome	Initiate POC study	2019	+
Mytesi	US	Short bowel syndrome	POC data	2H19	++
Mytesi	US	Inflammatory bowel disease	Corporate partnership for IBD and IBS	2019	+
Mytesi	US	Inflammatory bowel disease	Phase 2a and Phase 2b studies initiate	2020	+
Mytesi	US	Inflammatory bowel disease	Phase 2a/2b data, initiate parallel Phase 3 studies	2020	++
Mytesi	US	Irritable bowel syndrome- Diarrhea	Initiate parallel Phase 3 studies	2021	+

Stock Significance Scale: + of moderate importance; ++ higher level; +++ highest importance.
Source: Dawson James

Bull Case. Mytesi (crofelemer) is an antisecretory already approved for non-infectious diarrhea in adult HIV patients which is one of the most common symptoms of both the disease and its drug treatment(s). In HIV-related diarrhea, Jaguar is building a Mytesi-dedicated sales force with the addition of 14 new reps in 2018. The company is expecting to generate $15M plus by YE-2019 with the potential to reach over $100M in out years. Jaguar is expanding the utility of Mytesi to cancer therapy diarrhea (CTD), Irritable Bowel Syndrome (IBS) and Inflammatory Bowel Disease (IBD), idiopathic diarrhea, general watery diarrhea and orphan indications for Congenital Diarrheal Disorder (CDD) and short bowel syndrome (SBS). CTD affects 65% of the 650,000 patients receiving chemotherapy and is one of the most common reasons patients stop treatment. New chemotherapy drugs like Puma's Nerlynx (neratinib) and Lilly's abemaciclib have improved clinical outcomes for many patients but also induce severe diarrhea in over 90% of patients. Beyond CTD, diarrhea impacts a high percentage of patients with IBS, IBD, CDD, and SBS. The only options patients have had are anti-motility drugs like Imodium and adsorbents like Pepto-Bismol, which have poor efficacy and do not treat the source of diarrhea. An anti-secretory like Mytesi specifically normalizes the excess secretion of water into the bowels as such Mytesi could become the new standard of care for prophylaxis and/or treatment of diarrhea across multiple indications. Several clinical trials are expected to initiate over the next year, depending on funding, and should provide catalysts for the stock as data emerges. Each indication for diarrhea could generate over $100M for Jaguar. In addition, Jaguar also has a pipeline of indications for animals from dogs and cats to race horses that can be significant revenue drivers for the company. With an approved product, an expanding sales force and building revenues in the HIV indication alone point to upside. Expansion to additional diarrhea-related indications gives Jaguar multiple shots on goal (both humans and animals) and has not been factored in.

Bear Case. Mytesi was approved for HIV-related noninfectious diarrhea in 2012 and has struggled to gain traction in the market. Jaguar is planning to expand to multiple indications including CTD, IBS, IBD, CDD, and SBS with 10 phase 2 and phase 3 trials expected to initiate in the next two years, as well as indications in animal health. The company has limited supporting data for these indications and bears are concerned that the company does not have a clear clinical path forward to get approvals for indications beyond HIV. We do know that the company has an end of Phase 2 meeting in CTD scheduled with the FDA in February. With upwards of ten clinical trials operating expenses are going to rise significantly, and with a low cash balance, Jaguar will need to go to the capital markets multiple times, diluting investors.

Our Take. Crofelemer could be the new treatment paradigm for diarrhea, in both humans and animals. The merger of Jaguar Animal Health and Napo Pharmaceuticals brings together the human crofelemer pipeline (Napo) and the animal crofelemer-related pipeline (Jaguar). Crofelemer attacks diarrhea at its source, secretion of water into the bowel. This is differentiating as the only available drugs on the market are anti-motility (Imodium et al.) and adsorbant (Pepto) agents. Crofelemer is a naturally derived product from a sustainable source that has a positive safety profile. Mytesi (Crofelemer for human use) is already approved for HIV-related diarrhea and is expected to generate over $15M plus by YE-2019. The HIV opportunity alone could generate over $100M in out years. The goal for Jaguar is label expansion into blockbuster-sized indications- Cancer treatment diarrhea (CTD), IBS and IBD. The company is also targeting rare diseases like short bowel syndrome and congenital diarrheal disorders, as well as tropical diseases like Cholera. For the latter, Jaguar could receive a tropical disease priority review voucher for a second-generation antisecretory that could potentially be monetized. The bottom line is that each of these indications could be worth 100's of millions of dollars or more to Jaguar. With Mytesi already approved for HIV diarrhea and with an established safety profile and GMP manufacturing in place as well as clinical data to support its use as an anti-secretory, approval timelines for additional indications could be accelerated. Multiple Phase 2 and Phase 3 studies should initiate in 2019, funding dependent, and these should provide catalysts for the stock as data emerges. In addition to the human indications, Jaguar has a deep pipeline of indications for crofelemer and crofelemer-related products in animals including for dogs (Canalevia) and performance race horses (Equlevia). Capital may present a risk. While Jaguar did raise $7.3 million in cash at the end of 3Q18, but at the current burn rate, it's less than two quarter's worth of runway. The funds will support the announced sales force expansion for Mytesi and initial clinical development in other non-HIV indications. The Mytesi-focused sales force could increase revenue from HIV-related sales and potentially extend the runway, but Jaguar is likely to need to raise more capital. From a valuation perspective, in the HIV indication alone, generating $10-20M in revenue and considering fair value to be 3-5X points to upside at the current sub-$20M valuation. Success (any) is not factored in. Crofelemer could also become the new standard of care for treating diarrhea of essentially any etiology (human and animal indications) and as such, potential in other indications points to additional upside.

Finances. Jaguar Animal Health reported 3Q18 revenues which were driven by Myesti sales of $1.6 million gross ($1.1 million net). We estimate the company has close to $6.3 million in cash today which includes a nine million dollar raise the company closed in October 2018. Based on projected revenues we believe Jaguar could have up to a year's worth of cash on the balance sheet. Our model assumes the company will raise additional capital and we assume the accompanying dilution. The company based on our estimates has just over 33 million fully diluted shares outstanding, and we assume that number almost doubles by 2028.

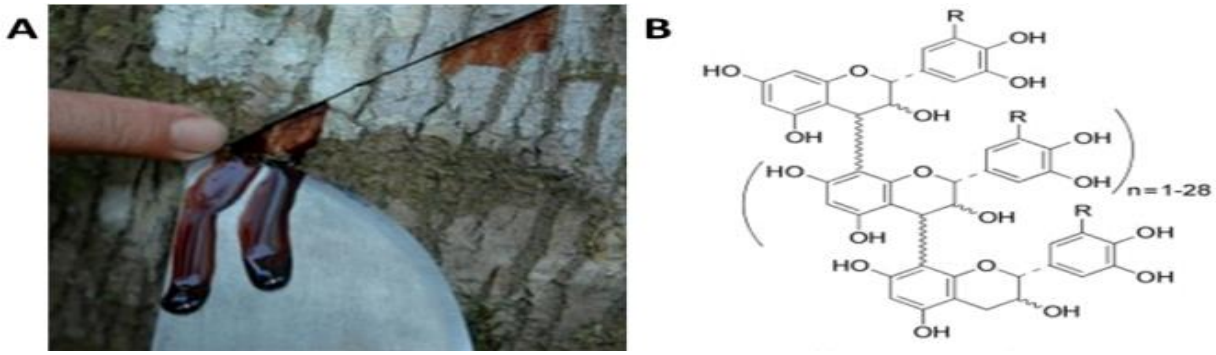
Our Optimistic View

Our view of Jaguar is generally bullish with one critical caveat, the company's cash balance remains constrained. Jaguar just raised capital in September 2018. We estimate $7.3 million net after all fees. Based on our model, this means that the company has $6.3 million in cash today. We see capital constraints as a factor that is likely to limit the near-term success of Mytesi, but we believe with time, and continued effort sales could grow. As a result of limited capital, we expect Jaguar to prioritize Mytesi commercial plans in HIV. Jaguar did just announce that the company has engaged T.R. Winston & Company to advise on collaboration, licensing and development activities related to Mytesi and Crofelemer. With additional funding or a partner, we hope to see the development of crofelemer in CTD, which could be a significant indication for the company. As CTD in our model is not currently prioritized, we apply just a 30% probability of success, which otherwise would be higher at 70% for this indication. With additional capital and growing Mytesi sales, we see multiple drivers for a higher valuation at Jaguar. We can break down these drivers as follows: (1) crofelemer has the potential to be a best-in-class product in the anti-diarrhea marketplace, in its approved indication (HIV chronic diarrhea). Jaguar has a focused effort to commercialize the product. We expect to see sales of up to $15 million next year or a 2% share of the HIV opportunity; (2) the company is pursuing cancer therapy diarrhea (CTD), which is a large market opportunity. A typical side effect of chemotherapy and targeted biologic cancer immune therapy is diarrhea. Given the high annual incidence rate of cancer, approximately 1.6 million people annually, a label indication for CTD should open the market to the company. One investigator study in CTD is underway, sponsored by Genentech, a division of Roche, and another sponsored by Puma Biotechnology has started. We may have some interim data from one study by year's end, but top-line data is not expected until late 2019 or 2020; (3) a second-generation product, SB-300, is being developed for cholera. If successful, it should qualify for a Priority Review Voucher (PRV), which in our opinion can then be monetized; (4) Jaguar has orphan indication for treatments for diarrhea associated with short bowel syndrome (SBS) and applied for orphan status in congenital diarrheal disorders (CDD). This may provide a fast path to the marketplace. We expect product pricing would be high, consistent with other orphan products; (5) Jaguar is pursuing business development deals, regionally and indication based (IBD/IBS/idiopathic diarrhea), that if successful could bring in upfront capital and support the build out of a global presence for Mytesi; and (6) animal health too, diarrhea in dogs. While animal health is not the priority, it could generate modest revenues and does represent future potential with the addition of resources. We also see the potential to divest this business at the right time as a source of capital.

Mytesi could be a best-in-class product. As an approved product from an abundant natural source with a unique mechanism of action, we see Mytesi as a validated, safe product in the anti-diarrhea marketplace. Now that a re-launch under Jaguar's leadership is taking place as of 2017, we believe successful commercialization in the HIV market is a critical first step for the product to establish its place in the anti-diarrhea marketplace.

Mytesi (crofelemer) is a botanical drug extracted and purified from the latex of the *Croton lechleri* tree colloquially known as "Dragon's Blood." Crofelemer was discovered in the 1990s through the science of ethnobotany (the scientific study of traditional knowledge and customs of people concerning plants and their medical, religious, and other uses). Crofelemer is an oligomeric molecule, which is composed of a combination of proanthocyanidins and prodelphinidins with up to 30 (epi)catechin or (epi)gallocatechin units per molecule with a total atomic mass up to 9 kDa.[1] It has been and is today used by the indigenous people of the South American rainforest to treat diarrhea and for wound care. The molecule appears to work by blocking two structurally unrelated chlorine ion secretory channels in the gut that reduces and normalizes the concentration of chloride ions present and as a result decreases the excretion of sodium ions and water. The mechanism is selective and doesn't block other ion channels in the gut and does not affect cAMP or calcium signaling. In addition to selectivity, crofelemer is not absorbed into the bloodstream and is excreted from the body relatively quickly. Crofelemer is well tolerated with a positive safety profile, which makes it ideal for chronic use.

Exhibit 3. Crofelemer Source and Structure



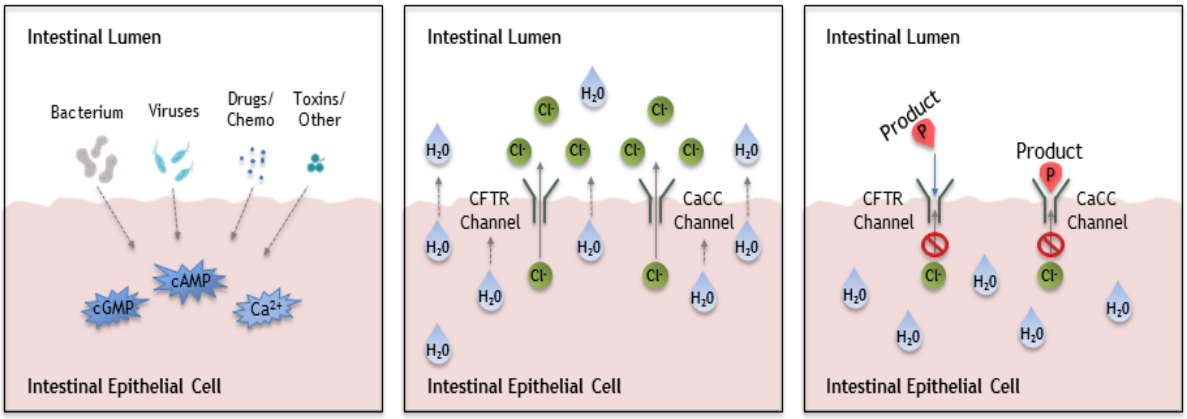
Source: Jaguar Health.

Crofelemer acts locally in the gut to block calcium-activated chloride channel anoctamin-1 (CaCC) and the cystic fibrosis transmembrane conductance regulator (CFTR) chloride channels with an inhibition of 90% and 60%, respectively. By blocking these

[1] Cottreau, Jessica, et al. "Crofelemer for the Treatment of Secretory Diarrhea." Expert Review of Gastroenterology & Hepatology, vol. 6, no. 1, 2012, pp. 17–23.

channels, the concentration of chloride ions in the gut is normalized, which lowers the secretion of sodium ions and water. Crofelemer is selective for these two channels and is not absorbed into the bloodstream as such crofelemer is excreted (not metabolized) with stool passing.

Exhibit 4. Mytesi (Crofelemer) Mechanism of Action



Source: Jaguar Health.

The opportunity for HIV. Crofelemer is sold as brand name Mytesi for HIV-associated noninfectious diarrhea. HIV is a transmitted lentivirus (sexually, blood transfusion) affecting 1.1 million Americans with an estimated 37,600 new cases each year.[2] HIV infects cells in the human immune system such as macrophages, helper T cells ($CD4^+$ T cells), and dendritic cells through a number of mechanisms including pyroptosis of infected T cells, apoptosis of uninfected bystander cells, direct viral killing of infected cells, and killing of $CD4^+$ T cells by CD8 cytotoxic lymphocytes that recognize the infected cells. When $CD4^+$ T cell levels reach below a critical level, cell-mediated immunity is lost, and the patient becomes highly susceptible to infection. The disease has no cure as of yet and without treatment, the average survival time is between nine and 11 years.

Antiretroviral treatment (ART) is the current standard of care for HIV, and the purpose is to prevent the patients from progressing to AIDS. ART has been successful at extending the life of patients diagnosed with HIV to the point that HIV has become a chronic condition where patients can expect to have a high probability of not progressing to AIDS and living a full and healthy life. ART can be broken up into five classes based on which part of the retroviral life cycle it disrupts: (1) entry inhibitors interfere with the binding fusion and entry of the virus to the host; (2) nucleoside reverse transcriptase inhibitors (NRTI) and nucleotide reverse transcriptase inhibitors (NtRTI) prevent reverse transcription of the virus's RNA into DNA by acting as a chain terminator; (3) non-nucleoside reverse transcriptase inhibitors (NNRTI) prevent reverse transcription by binding to and inhibiting reverse transcriptase; (4) integrase inhibitors inhibit the viral enzyme integrase which prevents the virus from integrating its DNA into the target cell; and (5) protease inhibitors block the viral enzyme protease which is necessary to produce mature viruses, and viruses produced in the presence of protease inhibitors are often defective and non-infectious. The most common course of treatment is combination therapy where the patient is prescribed several ARTs to target the disease from multiple angles. According to the World Health Organization (WHO), approximately 53% of Americans living with HIV, or 583,000 people, are currently on an ART.[3]

HIV-associated noninfectious diarrhea is a condition which can be a result of the HIV itself, or ART-induced and is one of the most common complications associated with the disease. Prior to the introduction of antiretrovirals, most HIV-associated diarrhea was infectious, meaning it was caused by an opportunistic infection rather than HIV or medication, but with the decrease in the prevalence of infectious diarrhea came an increase in noninfectious diarrhea. Noninfectious diarrhea is broken down into two major groups, HIV enteropathy or ART-induced. HIV enteropathy is a term for diarrhea in HIV patients where an infectious cause is not found. The mechanism for this is not known, but there are several hypotheses.[4] ART-associated diarrhea is a common side effect of ART and protease inhibitors seem to be the most strongly associated with diarrhea. Mouse models have shown protease inhibitors and reverse transcriptase inhibitors to increase the secretion of water and electrolytes into the intestinal lumen.[5] Due to the aging HIV population in

[2] CDC. Singh S, Song R, Johnson AS, McCray E, Hall HI. HIV incidence, prevalence, and undiagnosed infections in men who have sex with men. Conference on Retroviruses and Opportunistic Infections; February 14, 2017; Seattle, WA.

[3] *" Prevent HIV, Test and Treat All - WHO Support for Country Impact." World Health Organization, World Health Organization, www.who.int/hiv/pub/progressreports/2016-progress-report/en/.*

[4] Dikman, Andrew E. et al. "Human Immunodeficiency Virus-Associated Diarrhea: Still an Issue in the Era of Antiretroviral Therapy." *Digestive Diseases and Sciences* 60.8 (2015): 2236–2245. *PMC*.

[5] Dikman, Andrew E. et al. "Human Immunodeficiency Virus-Associated Diarrhea: Still an Issue in the Era of Antiretroviral Therapy." *Digestive Diseases and Sciences* 60.8 (2015): 2236–2245. *PMC*.

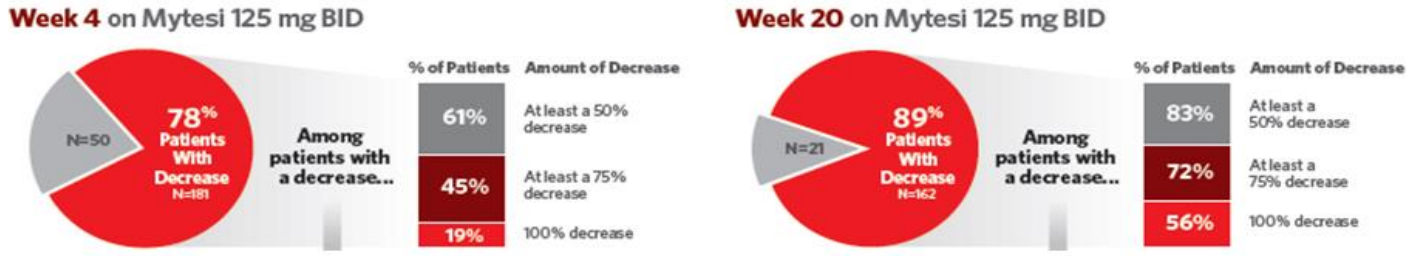
the U.S., it is estimated that >50% of the HIV population experiences chronic diarrhea from the virus living in their gut, and initiation of a new ART causes diarrhea in 15% of cases.

Competition for Mytesi generally includes the three major groups of antidiarrheal drugs: antisecretory drugs; antimotility drugs; and adsorbents. Antisecretory drugs inhibit the secretory mechanisms of the intestinal lumen. This category includes crofelemer and an injectable medication called octreotide, which mimics natural somatostatin and reduces GI secretions and motility. Octreotide also works on glucagon, insulin, and growth hormone and thus has multiple hormonal side effects. Antimotility drugs are typically opioid-based drugs which reduce diarrhea by slowing down peristalsis and increasing fecal transport time which gives the gut more time to remove water, having the effect to harden the stool. Loperamide is a common over-the-counter antidiarrheal, which is an opioid that doesn't cross the blood-brain barrier. Opium tincture is a treatment for severe diarrhea that does not respond to treatment such as loperamide. Due to the high concentration of morphine, its use is highly restricted, and dosage must be carefully calculated. Adsorbents act by absorbing fluids and compounds in the gut in order to improve stool consistency. Common adsorbents include bismuth-based medications like Pepto Bismol and Kaopectate which contains kaolinite and pectin.

Current treatments for HIV-associated noninfectious diarrhea tend to focus on adsorbents and antimotility agents. Adsorbents such as bismuth subsalicylate act by adsorbing fluids and compounds to improve stool consistency however the only study performed on this class of medicine for HIV showed no significant improvement in bowel movement frequency or consistency. Antimotility agents slow down peristalsis and allow the gut more time to remove water from the loose fecal matter. Loperamide, as mentioned, is an opioid medication, which has some evidence for chronic use in HIV patients where loperamide provided relief to 32% of patients. The problem with antimotility agents for long-term use is treatment-related AEs and interactions with ART. As such, long-term use is prohibited by the label. Antisecretory agents work by inhibiting the secretory processes within the enterocyte, and the mechanisms can vary greatly. Octreotide is a synthetic analog of somatostatin, which is administered subcutaneously and has been shown to be effective in treating noninfectious diarrhea. However, octreotide can cause severe hormonal effects, such as insulin/glucagon imbalances, which lead to hypo/hyperglycemia, and gastrointestinal effects such as gallbladder contractility, nausea, abdominal discomfort, and constipation, as well as injection site pain.

Does Mytesi work in HIV? Mytesi received FDA approval on December 31, 2012, for symptomatic treatment of noninfectious diarrhea in adult HIV patients. The drug was approved under the brand name Fulyzaq by Salix Pharmaceuticals and is now sold under the brand name Mytesi by Napo. The basis for the approval was a 20-week pivotal trial ending October 2012 where Mytesi showed it reduced diarrhea in 78% of patients after four weeks and 89% of patients after 20 weeks. In a trial tracking the results of Mytesi over time in patients with HIV-associated noninfectious diarrhea, 61% of patients experienced at least a 50% reduction in watery stools after four weeks of treatment. After 20 weeks of treatment, 83% of patients had at least a 50% reduction, and more than half had a 100% decrease in watery stools.

Exhibit 5. Clinical Outcomes of Mytesi in Patients with HIV-Associated Noninfectious Diarrhea



Source: Jaguar Health Presentation at the International AIDS Conference, June 2017.

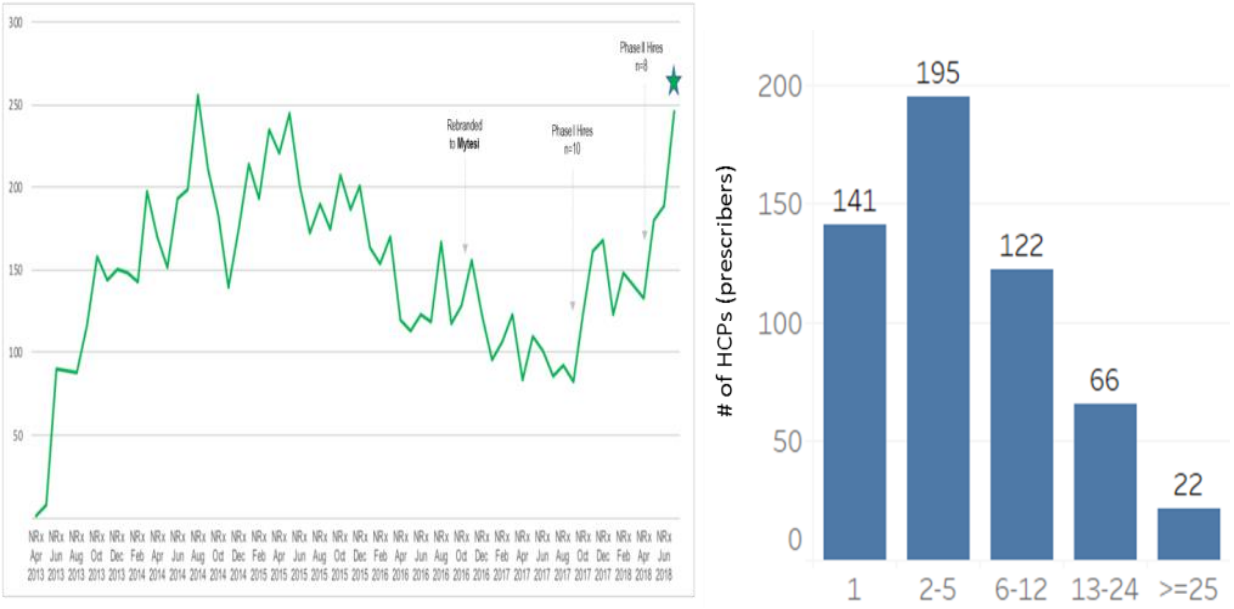
Reimbursement. Napo signed an agreement with the AIDS Drug Assistance Program (ADAP) Crisis Task Force for Mytesi in April 2018, providing pricing for Mytesi to each U.S. state's ADAP organizations that provide HIV-related services and approved medications to 500,000 plus people annually. ADAPs provide Mytesi free of charge to patients who qualify and copay support for some patients who have insurance coverage. Mytesi is currently on the ADAP formulary in 23 plus states, and the company is pursuing additional ADAP formulary listing in the remaining states. Mytesi is covered by all of the top ten commercial insurance plans, representing greater than 245 million U.S. lives and is covered by the top ten Managed Medicare plans representing another 2.4 million lives. Mytesi is covered on Medicaid in all 50 states. The company has a copay coupon program to offset the cost to patients and has instituted the NapoCares Patient Assistance Program which assists patients with benefit verification, prior authorization, and claims appeals.

The salesforce is in place. Jaguar currently deploys 15 Mytesi sales representatives, strategically positioned to cover U.S. geographies with the highest potential. The salesforce is supported with a full complement of patient and healthcare practitioner education programs, direct-to-consumer advertising campaigns, publication-focused efforts, the NapoCares Patient Assistance Program, and government affairs activities regarding neglected comorbidities of HIV. Jaguar (Napo) also hired RedHill Biopharma to help commercialize Mytesi. In June 2018, the two companies completed an agreement to promote Mytesi. RedHill has a specialized, GI-focused U.S. field salesforce numbering 36 salesmen that are now promoting Mytesi to healthcare practitioners in 38 territories within the U.S., each of which contains

significant numbers of HIV patients and healthcare practitioners that are not currently covered by Napo's field salesforce. In these regions, RedHill sales representatives plan to target gastroenterologists and other practitioners who see high volumes of HIV patients. This includes nurse practitioners and physician assistants. Additionally, RedHill field representatives intend to target lower-decile infectious disease specialists in regions currently covered by Napo's salesforce, and four internal (telephone marketing) RedHill inside sales representatives plan to target healthcare practitioners in other regions not covered by the Napo or RedHill field representatives. We assume a low double-digit percentage of sales go to RedHill.

The challenge for Jaguar now is to both grow the number of physician prescribers and the number of written prescriptions per prescriber. Our understanding is that the trends since Jaguar has taken over and deployed its salesforce, is showing that the market is promotionally sensitive. Physician awareness is still low suggesting that revenues should grow as awareness builds. This view is supported by the data collected this summer (July 2018) below.

Exhibit 6. Monthly New Prescription Share and Physician Quintiles by Number of Prescriptions as of July 2018



Source: Jaguar Health.

Cancer therapy diarrhea (CTD). Chemotherapy, biologics targeted therapy, cancer immune therapy, and radiation are just some of the agents used to treat cancer. Chemotherapy drugs are typically cytotoxic drugs, which damage cells by inhibiting part of the mitotic cycle. This leads to apoptosis in rapidly replicating cells but causes many adverse events as the treatment is systemic and non-cancerous cells are affected as well. In the U.S., over 650,000 cancer patients receive chemotherapy each year.[6]

CTD is one of the most common adverse events experienced by cancer patients. While the exact mechanism is not known, there is evidence that suggests an imbalance between absorption and secretion of fluid in the gastrointestinal tract as a possible cause. CTD is widespread with estimates ranging between 50% and 80% of patients receiving chemotherapy experiencing some grade of diarrhea and up to 33% of patients experiencing severe (grade three or four) diarrhea, which requires hospitalization. The overall number of patients experiencing CTD is high, but the prevalence varies widely between different chemotherapy regimens. The medications most associated with CTD are irinotecan and fluorouracil; however, EGFR tyrosine kinase inhibitors and monoclonal antibodies have also been known to cause CTD.[7] An example of an investigational drug with a high incidence of CTD is Lilly's (LLY; not rated) abemaciclib which is a CDK inhibitor designated as a breakthrough therapy for first-line breast cancer treatment. The number of patients experiencing all-grade diarrhea in Lilly's Phase 2 MONARCH study reached 90.2%, and in that study, diarrhea was the most common adverse event, which triggered dose reductions in 20.5% of patients.[8] Neratinib is a recently approved chemotherapy treatment developed by Puma Biotechnology. In Puma's Phase 3 ExteNET trial, patients were treated with neratinib treatment plus loperamide (as needed). Approximately 96% of patients experienced diarrhea with 40% experiencing grade three diarrhea. Overall 16% of patients ceased treatment with neratinib. Puma then initiated the Phase 2 CONTROL trial to examine the effect of prophylactic loperamide on neratinib-induced diarrhea. The trial demonstrated that 30.7% of patients experienced grade three diarrhea in the loperamide prophylaxis cohort, 23.4% in the budesonide and loperamide cohort, and 11.5% in the colestipol and loperamide cohort. Among patients in the loperamide group, 20.4% of patients discontinued their treatment.[9]

The current standard of care for CTD includes treatment with antimotility agents such as loperamide and tincture of opium, and antisecretory agents such as subcutaneous octreotide. High-dose loperamide is the first-line treatment for CTD which persists longer than 24 hours. If symptoms persist for longer than 48 hours, loperamide treatment is ceased, and second-line treatments (opium tincture and octreotide) are considered.

Two key investigator initiated, and corporate sponsored trials are working to demonstrate the effect of crofelemer in CTD patients. Jaguar, in advance of these studies, completed a small, eight canine pilot safety study. Two of the eight animals had unformed feces prior to treatment with 100% resolution, post-treatment. As the mechanism of action (CFTR channel blockade in the gut) is conserved in all mammals, in our opinion, this study should be a good predictor for man, albeit the sample size is small.

The HALT-D study at Georgetown University (on-going) is an investigator-initiated trial evaluating the incidence and severity of diarrhea in patients receiving crofelemer for prophylactic antidiarrheal management. The study was initiated and paid for by Genentech and supported by Napo. It is designed to examine the effects of crofelemer on HER2-positive breast cancer patients being treated with THP, a combination chemotherapy containing Taxotere (docetaxel), Herceptin (trastuzumab), and Perjeta (pertuzumab). Pertuzumab and trastuzumab are monoclonal antibodies specifically used to treat HER2-positive breast cancer but have been known to cause diarrhea in 40-80% of patients. The study is designed to examine if crofelemer can provide a quality of life improvement and increase the patient's ability to tolerate the chemotherapy regimen.[10] An interim analysis of 25 patients is expected to read-out 1Q19, but as the timing is investigator-led, timing is uncertain.

The HALT-D investigator-initiated study is investigating the incidence of all grade diarrheas in patients who receive crofelemer twice daily as a prophylactic treatment versus the current standard of care, which is no prophylaxis. Patients (N=46) with HER2-positive breast cancer treated with THP or TCHP (THP plus carboplatin) is to be randomly assigned (1:1) into these two treatment arms and stratified to THP with docetaxel, THP with paclitaxel, or TCHP. In addition to incidence, the study plans to look at the onset to first diarrheal episode, duration of diarrhea, use of anti-diarrhea medication, stool frequency, and consistency.

[6] "Preventing Infections in Cancer Patients." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 26 Apr. 2017, www.cdc.gov/cancer/preventinfections/providers.htm.

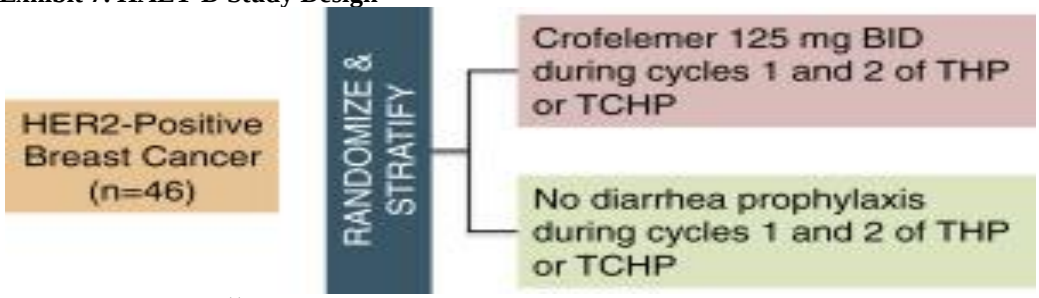
[7] Koselke, Elizabeth A, and Shawna Kraft. "Chemotherapy Induced Diarrhea Options." Journal of Hematology Oncology Pharmacy, vol. 2, no. 4, Dec. 2012.

[8] Broderick, Jason M. "Abemaciclib Improves PFS in Phase III Breast Cancer Trial." OncLive, 20 Mar. 2017, www.onclive.com/web-exclusives/abemaciclib-improves-pfs-in-phase-iii-breast-cancer-trial.

[9] "Puma Biotechnology Presents Interim Results of Phase II CONTROL Trial of PB272 in Extended Adjuvant Treatment of HER2-Positive Early Stage Breast Cancer at the 2017 AACR Annual Meeting." 4 Apr. 2017.

[10] Gao JJ et al. "HALT-D: A Phase II Evaluation of Crofelemer for the Prevention and Prophylaxis of Diarrhea in Patients with Breast Cancer on Pertuzumab-Based Regimens." Clinical Breast Cancer. Feb 2017. 17(1):76-78.

Exhibit 7. HALT-D Study Design



Source: Gao JJ et al.[11]

A second investigator sponsored study at UCSF is being planned and funded by Puma Biotechnology to examine the incidence and severity of diarrhea in patients receiving adjuvant trastuzumab and neratinib followed by one year of daily neratinib in the setting of prophylactic antidiarrheal management. This study, which has not yet begun, is designed to evaluate grade three diarrhea rates in patients taking daily intensive loperamide treatment, with twice daily crofelemer as prophylaxis against diarrhea. The study is planned to take place over the course of a year of treatment with prophylactic antidiarrheal agents given for the first two cycles of treatment (42 days) and then given as needed for the duration of treatment. The timing for data is uncertain, but we can estimate approximately a year from the start of the study.

Product strategy. Jaguar intends to seek a Special Protocol Assessment (SPA) for a follow-on indication for Mytesi for symptomatic relief of diarrhea in cancer patients receiving chemotherapy. The plan is to focus on patients who are receiving at least one tyrosine kinase inhibitor (TKI) as this class of therapy is known for diarrhea as an adverse event. The company expects to announce an agreement with the U.S. FDA for a SPA by year-end 2018. In that scenario, a 240-person trial could initiate by 1Q19, also depending on the availability of capital resources, which could set the stage for commercialization by 2021 in CTD. The assumed cost of the program is $12 to $15 million. As the timing is highly dependent on funding, we apply a low probability of success to this program of just 30%, which otherwise would be higher.

Exhibit 8. Proposed CTD Study Parameters

Indication	Cancer patients receiving at least one TKI in their chemotherapy regimen (not focused on a particular cancer subtype). Minimum inclusion criteria for patients has to be at least one watery bowel movement per day.
Efficacy end point - primary	50% reduction in watery bowels movement compared to baseline over an 8-week treatment period (two cycles of chemotherapy + background chronic TKIs). BM counts to be measured on a weekly (&/or daily) basis. Patients benefits to be most observed over the 8-week period
Dosage & Pricing	**Target dose:** 125 mg Mytesi twice a day, oral tablets **Target price:** $652 per 60 count bottle

Source: Jaguar Health.

Priority Review Voucher (PRV). Since 2007, the U.S. FDA has issued Priority Review Vouchers (PRVs) to sponsors of approved tropical disease product applications that meet certain criteria. To qualify for a PRV, a sponsor's application must be for a drug or biological product for the prevention or treatment of a "tropical disease," must otherwise qualify for priority review, and must contain no active ingredient (including any salt or ester of an active ingredient) that has been approved in any other application under section 505(b)(1) of the FD&C Act or section 351 of the Public Health Services Act. Once the sponsor obtains a PRV, the voucher can be used to obtain a priority review designation for a subsequent application that does not itself qualify for priority review as described in the guidance. Over recent years, these vouchers have proven valuable. We know some have sold for between $110 million and up to $350 million. PRVs provide the sponsor with an incentive to develop products for important lifesaving medicines.

Tropical diseases such as cholera qualify for a PRV. Cholera is an acute diarrheal infection caused by ingestion of food and water contaminated with the bacterium *Vibrio cholera*. Cholera is a global threat with over 1.3 million cases per year and 21,000 to 143,000 deaths per year. It is worth mentioning that the worst outbreak of cholera in the world is being reported in Yemen today with 10,000 cases per week[12]. The United Nations is working on vaccination programs in the region. Lechlemer, a second generation anti-secretory, in the future, may be able to play a role in treatment if it were available.

Severe diarrhea associated with cholera leads to massive dehydration of the patient. Prior studies evaluated crofelemer in diarrhea from cholera and in bacterial infections. One study performed in India, in 2006-2007, evaluated crofelemer at 125 mg or 250 mg QID vs.

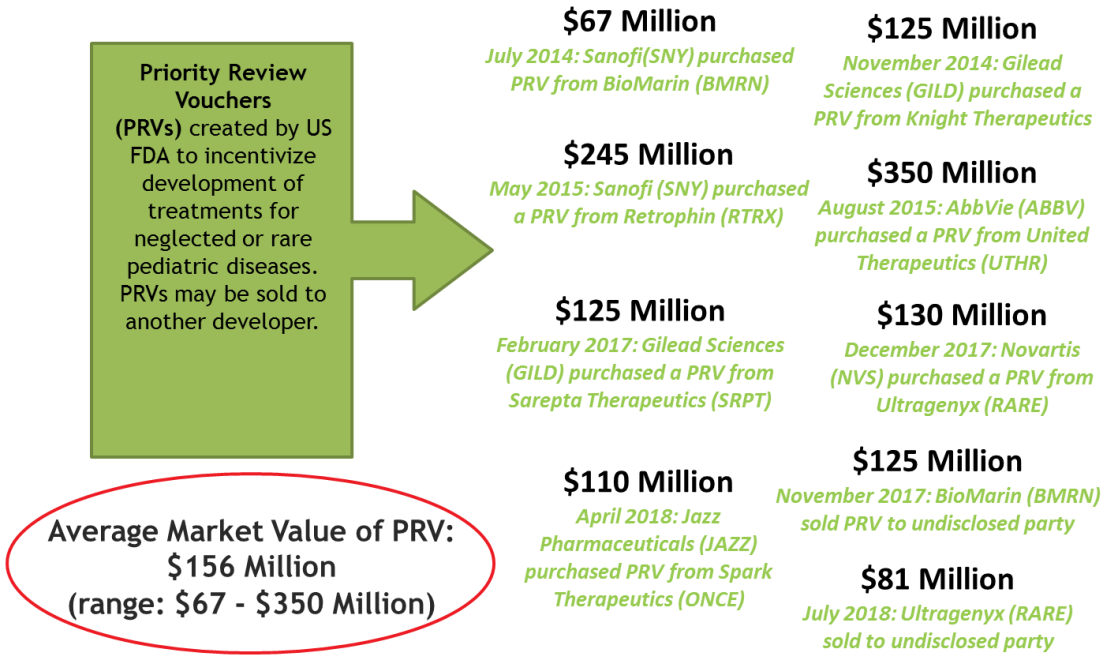
[11] Gao JJ et al. HALT-D: A Phase II Evaluation of Crofelemer for the Prevention and Prophylaxis of Diarrhea in Patients with Breast Cancer on Pertuzumab-Based Regimens. Clinical Breast Cancer. Feb 2017. 17(1):76-78.

[12] https://www.newsweek.com/yemen-cholera-outbreak-worst-world-10000-cases-who-1149984

placebo one hour after azithromycin in confirmed cholera cases with watery diarrhea.[13] The study was done in 100 patients randomized 1:2:2 (placebo, 125 mg QID, 250 mg QID). The results showed a 25-30% reduction in the amount of watery stool at 0-12-hour time periods (p=0.07), reducing total stool output (p=0.028). A second study was done (also in India), in adults with less than 24 hours of severe watery diarrhea[14] (N=98, randomized 1:1, crofelemer vs. placebo, 250 mg Q6H over two days). Statistically significant benefits were seen in seven prospectively defined clinical endpoints including change in mean stool weight and frequency, percent of patients with watery stools, formed stools, dehydration, mild fecal incontinence, and reduction in Gastrointestinal Index Score at the end of treatment. Crofelemer was deemed superior, with an overall clinical success rate of 79% vs. 28% (control).

For cholera (general watery diarrhea) a Phase 1/2 study is planned for SB-300, a second-generation antisecretory related to crofelemer. Jaguar could win a Priority Review Voucher which in our opinion could then be monetized if the medication is approved for this indication. Based on the company's current capital constraints, we do not include monetization of a PRV in our model, at this time. This is an assumption that we might expect to re-visit based on clinical progress of this program, the study design details, and timing of data.

Exhibit 9. Recent Examples of Monetized PRVs



1. https://www.raps.org/regulatory-focus/news-articles/2017/12/regulatory-explainer-everything-you-need-to-know-about-fdas-priority-review-vouchers

1

[13] Bardhan, et al., '08 US-Japan Cholera Conf.
[14] Bardhan PK EID,'09

Orphan Designation for short bowel syndrome (SBS) and congenital diarrheal disorders (CDD). Short bowel syndrome is a group of problems related to poor absorption of nutrients in the gut. People with SBS have had at least half of their small intestine removed, and sometimes all or part of the large intestine removed. Patients may have also had severe damage to the small intestine or suffer from poor motility in the small intestine. These patients cannot absorb enough water and nutrients, suffering from bloating, cramping, fatigue, foul-smelling stool, heartburn, gas, vomiting, and weakness. Diarrhea is a major concern. CDD is a group of inherited enteropathies associated with severe chronic diarrhea. Infants with CDD require feeding tubes due to an inability to absorb nutrients well. Diagnosed lifespan is into the teens. A proof of concept investigator-initiated trial is being planned for next year by Sheikh Kalifa Medical City in Abu Dhabi. Jaguar filed for Orphan Designation in CDD and filed for and received Orphan Designation for SBS in August 2017. Based on capital and other constraints we do not include any revenue for these indications.

Business development deals. Jaguar lacks the resources to develop all the potential indications for crofelemer. Two such indications include irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD) and idiopathic diarrhea. We hope to see the company secure a partnership to advance these indications where the existing data set is suggestive of efficacy. We also may see regional deals for Mytesi and additional pipeline products. We take note that in December of 2018 Jaguar engaged T.R. Winston & Company to advise on collaboration, licensing and development activities related to Mytesi and Crofelemer

Clinical development for IBS. IBS is a chronic condition which causes cramping, abdominal pain, bloating, gas, diarrhea, and constipation. The causes are largely unknown. It is estimated that between 10% and 15% of the global population has IBS with a prevalence of 25 to 45 million in the United States, although only 30% are diagnosed. Diarrhea is a common symptom, which affects 30% of the diagnosed IBS population. We believe the market opportunity if developed, could be significant.

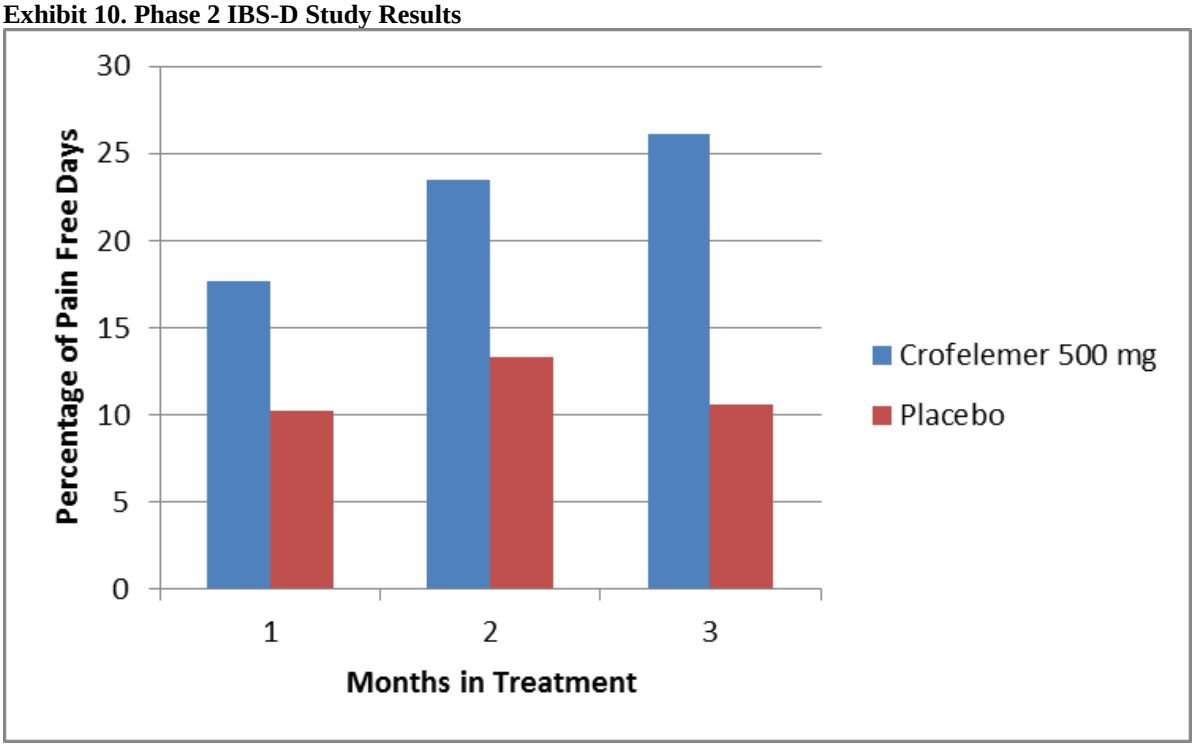
Current treatments for IBS typically address either the pain associated with IBS (considered to be the hallmark of disease) or the most troublesome symptoms, usually either constipation or diarrhea. For the pain and cramping associated with IBS, either antispasmodics such as dicyclomine or antidepressants in low doses can be prescribed. Dicyclomine is an antispasmodic which reduces intestinal and stomach cramping by relaxing the muscles in the stomach and intestines and by slowing movements in the gut. Antidepressants are sometimes used for IBS as the drugs work at the level of the brain and the spinal cord to block pain messages from the GI tract, reducing pain hypersensitivity related to IBS. Typically, selective serotonin reuptake inhibitors (SSRIs) are used in patients with constipation and tricyclics are used for patients in which diarrhea is the primary symptom. For diarrhea-predominant IBS, antimotility drugs such as Lomotil, Loperamide, Viberzi, or Lotronex may be used as well as bile acid binding agents like Prevalite, and Xifaxan which is an antibiotic. Lotronex (alosetron) is a 5-HT_3 antagonist, which inhibits the receptors in the enteric nervous system. Lotronex use is highly restricted due to a high incidence of ischemic colitis, a potentially life-threatening condition characterized by reduced blood flow to the intestines. Viberzi (eluxadoline) is a mu-opioid receptor agonist and delta-opioid receptor antagonist; the combined agonist-antagonist activity reduces the prevalence of constipation. Adverse events include an increased risk of pancreatitis.[15] Xifaxan (rifaximin) is an antibiotic which has been shown to reduce diarrhea and bloating however it can only be used as a 14-day course of treatment and patients typically relapse after two weeks. For constipation-predominant IBS, over-the-counter laxatives can be used in addition to secretory drugs like Linzess and Amitiza. Over the counter laxatives come in three varieties: osmotic (e.g., Milk of Magnesia); stimulant (e.g., Senokot); and propylene glycol (e.g., Miralax). Linzess (linaclotide) acts by activating the cell surface receptor of guanylate cyclase 2C, resulting in the elevation of cGMP levels and stimulation of chlorine, sodium, and water secretion into the intestinal lumen through the CFTR channel. Amitiza (lubiprostone) is a bicyclic fatty acid which activates the CIC-2 chloride channels, secreting chloride into the lumen similarly to Linzess.

Phase 2 study. A 2004-2005 study on the effects of crofelemer in male and female patients with irritable bowel syndrome with diarrhea (IBS-D) compared the results of three doses of crofelemer (125 mg, 250 mg, and 500 mg) on stool consistency, which was the primary endpoint, and percentage of pain-free days. No significant effect was shown on stool consistency; however female patients showed an improvement in the proportion of pain-free days which increased with continued duration of use of crofelemer. For the 500 mg arm of the study, female IBS-D patients showed improvement in the proportion of pain-free and discomfort-free days during treatment with 500 mg crofelemer at month one (crofelemer vs. placebo: 17.7% vs. 10.2%, p=0.098), month two (23.5% vs. 13.3%, p=0.076), and month three (26.1% vs. 10.6%, p=0.0076). No benefit was seen in male IBS-D patients. Crofelemer was well tolerated.[16] A supplemental analysis of the previously acquired data is planned to examine crofelemer's effects using current approval guidelines. We conclude that the data shown thus far is suggestive of a signal and perhaps strong enough to interest a partner which could pay the development costs, as well as establishing a safety profile. These studies are typically large, take a long time to complete, and are expensive. As such we do not include any revenues for this indication as part of our valuation.

[15] Maltz, Fraidy, and Brooke Fidler. "Eluxadoline (Viberzi): A Mu-Opioid Receptor Agonist for the Treatment of Irritable Bowel Syndrome with Diarrhea." Pharmacy and Therapeutics 42.7 (2017): 438–442. Print.

[16] Mangel and Chaturvedi. "Evaluation of Crofelemer in the Treatment of Diarrhea-Predominant Irritable Bowel Syndrome Patients." Digestion. December 2008. 78(4):180-6.

Exhibit 10. Phase 2 IBS-D Study Results



Source: Mangel and Chaturvedi 2008. [17]

Additional opportunity in the related indication inflammatory bowel disease (IBD). In IBD, there are specific subsets of patients having diarrhea identified by doctors. One group of IBD patients are those that have had surgical resection. The majority of these patients suffer from chronic severe diarrhea. In addition, over 30% of the IBD population has diarrhea due to bile acid malabsorption, which suggests that crofelemer as an antisecretory targeting CaCC and CFTR channels may be ideal for this population. Ideally, the company can find a corporate partner willing to invest the capital to develop crofelemer in these indications (also including idiopathic diarrhea).

Animal health. While Jaguar's origins are in animal health, the focus of the company has shifted towards human ethical pharmaceuticals. With that said, the company is still supporting legacy products used in canines and high-value equines.

Canine watery diarrhea is one of the most common reasons dogs are brought to the vet, affecting over six million dogs per year. Watery diarrhea in dogs is typically treated with antibiotics, probiotics, dietary restrictions, or products approved for human use such as antimotility agents or adsorbents. There are no antisecretory agents on the market, and the current treatments do not address the water loss associated with diarrhea.

Canalevia is a canine-specific formulation of crofelemer. Over 230,000 dogs receive chemotherapy in the U.S., and approximately 25% suffer from CID. Jaguar has received Minor Use in a Minor Species (MUMS) designation for Canalevia for CID in dogs. MUMS designation is similar to human Orphan Drug status. The company is submitting all required major technical sections of a New Animal Drug Application (NADA) filing. The FDA has indicated that use of Canalevia for treatment of exercise-induced diarrhea (EID) in dogs qualifies as a "minor use," which means Canalevia is eligible for conditional approval for the indication. The company plans to conduct a commercial launch for CID in 2019 depending on resources. The only revenues we show in our model is a royalty associated with Canalevia of just $0.1 million in 2018, growing to $0.5 million in 2028.

Race horses. Jaguar and SEED MENA in December 2017 entered into a collaboration agreement for Equilevia, Jaguar's non-prescription, personalized, premium product for total gut health in equine athletes, or race horses. SEED is affiliated with Seed Group, a diversified group of companies under the umbrella of The Private Office of His Highness Sheikh Saeed Al Maktoum. The United Arab Emirates (UAE) is a global leader in horse racing, equine endurance competitions, and other equine athletic activities. The company hopes to work with the SEED network in the United Arab Republic and the Gulf Cooperation Council to drive Equilevia awareness and sales in the region. We do not include any revenues for Equilevia in our models.

[17] Ibid.

Product Model Assumptions

1. We assume an average price of $652 per month and the average HIV patient utilizes 3.5 months of therapy. We assume the RedHill salesforce picks up a small fee of 13% of gross sales that declines as sales numbers rise.
2. We assume a label extension occurs to include cancer therapy diarrhea (CTD) in 2021 with commercialization in 2021. We assume a three-month duration of treatment. The size of the CTD population is large, and the need is great. As such the commercial opportunity is substantial. We assume a 30% probability of success as the company lacks the capital to run the pivotal trial today. If we take our financial concerns out of the picture, we would raise our probability assumption to 70% based on both Mytesi's approval in HIV diarrhea and on the pending results of two investigator sponsored CTD trials expected later this year or early next year for one study and results of a second planned study a year from the time the study initiates.
3. We do not include any revenues for irritable bowel syndrome and inflammatory bowel disease as we assume the company lacks the resources to develop these indications on its own. The indications could be developed by a partner, and we hope to see this happen.
4. Orphan Designation for short bowel syndrome (SBS) and congenital diarrheal disorder (CDD) is not reflected in our model at this time but could represent new indications with a fast path to the marketplace. Again, capital constraints are a limiting factor, in our view.
5. The company is planning to develop a next-generation therapy, SB-300, for cholera and this could result in a Priority Review Voucher (PRV). At this time, we do not include a PRV in our model.
6. We show a nominal royalty revenue of just $0.1 million in full-year 2018, growing to $0.5 million in 2028 for Canalevia. We do not include any other revenues at this time for the animal products business.
7. The company, based on our estimates, has $6.3 million in capital and the stock price is trading at the $0.25 level. We estimate the current fully diluted share count is 33.5 million shares and assume this number could climb with additional financing before the company is cash flow positive. For modeling purposes, we assume an out-year share count of 60.7M shares in 2028.
8. Sum-of-the-parts model assumptions. We apply the same discount rate we use in our FCFF and discounted-EPS models in our sum-of-the-parts model. We apply the same probabilities to each product, each indication as well.
9. Discount rate. Based on our research, which considers Jaguar's financings, we use a projected WACC of 15%, which we believe is in-line with the current commercial position of the company. To this 15%, we add an additional 15% based on the risks associated with launching a new product (Mytesi) in new indications, including HIV associated chronic diarrhea. Our actual applied discount rate is 30%. Typically for mature, stable companies with a high level of visibility around earnings, we expect a lower discount rate of 10%. Conversely, for companies in early stages of development, often with binary events determining future growth rates, or in our opinion, with capital constraints, we expect a higher cost of capital and select a higher discount rate of 30%, as is the case for Jaguar. As Jaguar's Mytesi sales develop, this rate may prove to be too conservative.

Exhibit 11. HIV-Related Noninfectious Diarrhea Market Model (U.S.)

HIV-associated noninfectious diarrhea (US)	2016A	2017A	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Prevalance of HIV	1,100,000	1,147,500	1,195,950	1,245,369	1,295,776	1,347,192	1,399,636	1,453,128	1,507,691	1,563,345	1,620,112	1,678,014	1,737,074
Incidence	47,500	48,450	49,419	50,407	51,416	52,444	53,493	54,563	55,654	56,767	57,902	59,060	60,241
Increase in incidence	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Diagnosed HIV Population	942,857	983,571	1,025,100	1,067,459	1,110,665	1,154,736	1,199,688	1,245,539	1,292,307	1,340,010	1,388,667	1,438,298	1,488,921
Population on Antiretrovirals (55%)	518,571	540,964	563,805	587,103	610,866	635,105	659,828	685,046	710,769	737,005	763,767	791,064	818,906
HIV Population with Chronic Diarrhea (50%)	259,286	270,482	281,903	293,551	305,433	317,552	329,914	342,523	355,384	368,503	381,883	395,532	409,453
Market share		0.8%	1.0%	2.3%	4.0%	4.5%	5.0%	6.0%	7.0%	7.1%	7.2%	7.3%	7.3%
HIV Patients Treated with Mytesi	-	2,164	2,819	6,752	12,217	14,290	16,496	20,551	24,877	26,164	27,496	28,874	29,890
Cost of Treatment Annually	$ 2,282	$ 2,282	$ 2,305	$ 2,328	$ 2,351	$ 2,375	$ 2,398	$ 2,422	$ 2,447	$ 2,471	$ 2,496	$ 2,521	$ 2,546
Increase in Cost		1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Total Revenue ('000)		**$ 2,469**	**$ 6,497**	**$ 15,717**	**$ 28,725**	**$ 33,934**	**$ 39,563**	**$ 49,783**	**$ 60,864**	**$ 64,653**	**$ 68,623**	**$ 72,784**	**$ 76,099**

Source: Dawson James

Exhibit 12. Cancer Therapy Diarrhea Market Model (U.S.)

Cancer therapy diarrhea (US)	2016A	2017A	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Incidence of Cancer	1,680,000	1,716,960	1,754,733	1,793,337	1,832,791	1,873,112	1,914,321	1,956,436	1,999,477	2,043,466	2,088,422	2,134,367	2,181,323
Increase in Incidence	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Patients Receiving Chemotherapy (40%)	672,000	686,784	701,893	717,335	733,116	749,245	765,728	782,574	799,791	817,386	835,369	853,747	872,529
Cancer Therapy Diarrhea (65%)	436,800	446,410	456,231	466,268	476,526	487,009	497,723	508,673	519,864	531,301	542,990	554,935	567,144
Market share					0%	2%	4%	6%	8%	10%	14%	18%	20%
CTD Patients Treated with Mytesi					-	9,740	19,909	30,520	41,589	53,130	76,019	99,888	113,429
Cost Per Treatment					$ 2,000	$ 2,040	$ 2,081	$ 2,122	$ 2,165	$ 2,208	$ 2,252	$ 2,297	$ 2,343
Increase in Cost					2%	2%	2%	2%	2%	2%	2%	2%	2%
Total revenue ('000s)					$ -	$ 19,870	$ 41,427	$ 64,777	$ 90,035	$ 117,320	$ 171,218	$ 229,481	$ 265,800
Probability of Success					30%	30%	30%	30%	30%	30%	30%	30%	30%
Total Revenue ('000)					**$ -**	**$ 5,961**	**$ 12,428**	**$ 19,433**	**$ 27,010**	**$ 35,196**	**$ 51,366**	**$ 68,844**	**$ 79,740**

Source: Dawson James

Valuation. We model revenues for Mytesi in HIV-related diarrhea. Our model assumes commercial launches for crofelemer for cancer therapy diarrhea in 2021. We assume no other significant revenues. Our decision to assume no revenues at this time for other indications such as irritable bowel syndrome, inflammatory bowel disease, and cholera (including the possibility of the Priority Review Voucher) may be conservative. With a stronger balance sheet or upon securing a business development partnership, we would revisit these decisions. For the CTD indication, we assume just a 30% probability of success (see our model assumptions), which is driven by the need for $12.6 million (our estimate), to fund the study.

We use free cash flow, discounted-EPS, and sum-of-the-parts models and use a discount rate of 30% (based on 15% WACC and an additional 15%) to reflect our outlined risks, principally market share penetration of Mytesi in HIV chronic diarrhea. For similar reasons we assume a modest P/E multiple of just 10x based on the early stage of the product launch for crofelemer in a new indication (HIV chronic diarrhea), and the low cash level the company has today. For companies that are well established with mature products and revenues, we typically use a 10% risk rate and a higher P/E multiple of 15-20x. For early-stage companies that have not yet commercialized a product, or ones that may have capital constraints, we typically use a risk rate of 30%, as is the case for Jaguar. As the company's lead product, Mytesi, demonstrates market share gains, our risk rate may prove to be conservative. Our price target average of the three metrics is then rounded to the nearest whole number. Our price target is based on a fully diluted out-year share count (2028) of 60.7 million shares outstanding. The result of these metrics is a price target of $1.00.

Exhibit 13. Free Cash Flow Model

Average	1.0

Price Target	1.0
Year	2018

DCF Valuation Using FCF (mln):

units ('000)	2017A	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
EBIT	(35,150)	(18,288)	(4,049)	23	9,528	20,056	29,478	47,130	58,372	77,357	96,714	109,229
Tax Rate	0%	0%	0%	0%	0%	5%	8%	10%	12%	13%	15%	15%
EBIT (1-t)	(35,150)	(18,288)	(4,049)	23	9,528	19,053	27,120	42,417	51,367	67,301	82,207	92,844
CapEx	-	(7)	(100)	-	-	-	-	-	-	-	-	-
Depreciation	1	659	791	949	1,139	1,185	1,232	1,281	1,333	1,386	1,441	1,499
Change in NWC												
FCF	(35,149)	(17,635)	(3,358)	973	10,667	20,238	28,352	43,698	52,700	68,687	83,649	94,343
PV of FCF	(45,694)	(17,635)	(2,583)	575	4,855	7,086	7,636	9,053	8,399	8,420	7,888	6,844
Discount Rate	30%											
Long Term Growth Rate	1%											
Terminal Cash Flow	291,328											
Terminal Value YE2027	21,132											
NPV	61,670											
NPV-Debt	3,150											
Shares out ('000)	60,757	2028E										
NPV Per Share	1.0											

Source: Dawson James

Exhibit 14. Discounted-EPS Model

Current Year	2018
Year of EPS	2028
Earnings Multiple	10
Discount Factor	30%
Selected Year EPS	1.53
NPV	1.1

	Discount Rate and Earnings Multiple Varies, Year is Constant					
		5%	10%	15%	20%	25%	30%
Earnings Multiple	2	1.88	1.18	0.76	0.49	0.33	0.22
	5	4.69	2.95	1.89	1.23	0.82	0.55
	10	9.38	5.89	3.78	2.47	1.64	1.11
	15	14.07	8.84	5.67	3.70	2.46	1.66
	20	18.76	11.78	7.55	4.94	3.28	2.22
	25	23.45	14.73	9.44	6.17	4.10	2.77
	30	28.14	17.67	11.33	7.40	4.92	3.33
	35	32.83	20.62	13.22	8.64	5.74	3.88

Source: Dawson James

Exhibit 15. Sum-of-the-Parts Model

Jaguar Health, Inc	LT Gr	Discount Rate	Yrs to Peak $	% Success	Peak Sales (M)	NPV
Mytesi - HIV-induced diarrhea	1%	30%	4	100%	$76	$262
NPV						$0.91
Mytesi - Cancer therapy diarrhea	1%	30%	10	30%	$266	$917
NPV						$0.20
Mytesi - Irritable bowel syndrome- Diarrhea	1%	30%	6	0%	$100	$345
NPV						$0.00
Mytesi - Inflammatory bowel disease- Diarrhea	1%	30%	10	0%	$100	$345
NPV						$0.00
Canalevia	1%	30%	10	100%	$0.5	$2
NPV						$0.00
Equilevia - EGUS	1%	30%	10	0%	$0.5	$2
NPV						$0.00
PRV Cholera	1%	30%	6	0%	$100	$345
NPV						$0.00
Net Margin						60%
Shares Outstanding (M) in 2028E						61
Total						$1.1

Source: Dawson James

Intellectual property. Napo (a subsidiary of Jaguar), owns a portfolio of patents and patent applications covering formulations and methods of treatment with proanthocyanidin polymers isolated from Croton spp. or Calophyllum spp., including Mytesi (crofelemer). These patents include rights to a library of over 2,300 medicinal plants.

A key U.S. patent in this family is U.S. 7,341,744, which has a term until at least June 23, 2019. Napo has elected to extend the term of U.S. 7,341,744 under 35 U.S.C. 156, and the United States Patent and Trademark Office has issued a Notice of Final Determination that the patent term extension for U.S. 7,341,744 is 1075 days. Based upon the June 23, 2019 expiration date, the patent would be extended to June 2, 2022, to account for the regulatory delay in obtaining human marketing approval for crofelemer.

Napo additionally owns a family of patents arising from International Patent Application Publication WO2012058664 that cover methods of treating HIV-associated diarrhea and HAART-associated diarrhea with proanthocyanidin polymers isolated from Croton spp. or Calophyllum spp., including crofelemer. In the U.S. there are two issued patents, U.S. 8,962,680 and U.S. 9,585,868, both of which expire October 31, 2031.

Outside the U.S., patent protection for methods of treating HIV-associated diarrhea has been obtained in Australia, Europe, Hong Kong, Japan, Kenya, Mexico, Russia, Ukraine, South Africa, and Zimbabwe with expiration dates of October 31, 2031, and Napo has pending applications in Brazil, Canada, China, India, Japan, Mexico, and Malaysia. Napo also has patent families related to methods of treating diarrhea-predominant irritable bowel syndrome, constipation-predominant irritable bowel syndrome, and inflammatory bowel disease, familial adenomatous polyposis, and colon cancer with proanthocyanidin polymers isolated from Croton spp. or Calophyllum spp., including crofelemer. In particular, for diarrhea-predominant irritable bowel syndrome, Napo has one issued U.S. patent, which expires February 9, 2027, one pending application, issued patents in Australia, Europe, Japan, South Korea, Mexico, New Zealand, Singapore, and Taiwan, and pending applications in Bangladesh, Bolivia, Canada, Chile, Gulf States, Mexico, Panama, Peru, Paraguay, Thailand, and Venezuela, all of which are estimated to expire April 30, 2027.

For constipation-predominant irritable bowel syndrome, Napo has three issued U.S. patents, with terms to at least April 30, 2027, patents in Australia, Canada, Europe, Mexico, New Zealand, Singapore, and a pending application in India, all of which are estimated to expire April 30, 2027. For inflammatory bowel disease, familial adenomatous polyposis, and colon cancer, Napo has one issued U.S. patent, which has an expiration date of October 9, 2029, one pending application, issued patents in Australia, Europe, and a pending application in Canada, which has an estimated expiration dates of April 30, 2027.

Napo also co-owns with Glenmark (GNP: IN; not rated) issued patents in India, South Africa, and Eurasia that expire August 24, 2030, and cover a method of manufacturing with proanthocyanidin polymers isolated from Croton spp. or Calophyllum spp., including crofelemer. Napo holds two U.S. patents covering a formulation of NP 500 (nordihydroguiaretic acid (NDGA)) and its use in treating a metabolic disorder that has terms until April 23, 2031. Napo has filed a U.S. non-provisional application for the treatment of chemotherapy-induced diarrhea with crofelemer and two U.S. provisional applications on other human indications.

One patent family relates to International Patent publication WO1998/16111, which is for an enteric protected formulation of proanthocyanidin polymers isolated from Croton spp. or Calophyllum spp., including crofelemer, and methods of treating watery diarrhea using these enteric protected formulations.

Risk Analysis

In addition to the typical risks associated with micro-capitalized biotechnology and specialty pharmaceutical companies, we see potential risks specific to Jaguar as follows:

Clinical and regulatory risk. Mytesi is currently approved for the treatment of diarrhea in HIV patients. The company is seeking approval for additional indications such as cancer therapy-induced diarrhea. There is no assurance the product, Mytesi, or a second-generation version will be approved for any additional indications and even if approved, will be reimbursed by insurance or successfully commercialized.

Commercial risk. Initially, the focus of the company is on successfully developing Mytesi sales in HIV associated chronic diarrhea. We can make no assurances that the company will be able to achieve a critical level of market share to become profitable in this indication and or in additional planned indications.

Employee risk. Jaguar is a small company with a number of key employees. The success of the company will depend, to a great extent, upon the experience, abilities and continued services of its senior officers, sales staff, and key scientific personnel.

Financial risk. The company may need to raise capital in the marketplace, and there can be no assurances that the company will be able to successfully raise capital and do so on favorable terms.

Intellectual property risk. The company may have to defend its patents and technical know-how, and there can be no assurances that the patents will not be infringed or will be held as valid if challenged, and the company may infringe on third party's patents.

Salesforce risk. Jaguar has a small salesforce and is currently contracting with RedHill Biopharma as part of a co-promotion strategy. There can be no assurances that this strategy will remain enforced in the future.

Reimbursement and insurance payment risk. Insurance payment for products may be an additional hurdle for adoption.

Exhibit 9. Income Statement

Jaguar Health Inc.: Income Statement ($000)																				
YE December 31	2017A	1Q18A	2Q18A	3Q18A	4Q18E	2018E	1Q19E	2Q19E	3Q19E	4Q19E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Revenue:	-																			
Product Revenue	1,485																			
Mytesi - HIV-induced diarrhea		627	884	1,132	1,800	4,443	2,400	3,000	4,450	5,850	15,700	28,725	33,934	39,563	49,783	60,864	64,653	68,623	72,784	76,099
Mytesi - Cancer therapy diarrhea	-	-	-	-	-	-	-	-	-	-	-	-	5,961	12,428	19,433	27,010	35,196	51,366	68,844	79,740
Mytesi - Irritable bowel syndrome- Diarrhea		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mytesi - Inflammatory bowel disease- Diarrhea		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equilevia - EGUS			-	-	-	-	-	-	-	-										
Net revenue	1,485	627	884	1,132	1,800	4,443	2,400	3,000	4,450	5,850	15,700	28,725	39,895	51,991	69,217	87,875	99,849	119,989	141,628	155,839
Collaborative revenue:	-																			
Collaborative revenue	2,876	177																		
Canalevia Royalties - Canine Diarrhea		-	-	-	-		82	85	92	96	354	375	396	419	443	469	495	524	554	586
Total Collaborative Revenue	**2,876**	**177**	**-**	**-**	**-**	**177**	**82**	**85**	**92**	**96**	**354**	**375**	**396**	**419**	**443**	**469**	**495**	**524**	**554**	**586**
Total Revenue	**4,361**	**804**	**884**	**1,132**	**1,800**	**4,620**	**2,482**	**3,085**	**4,542**	**5,946**	**16,054**	**29,099**	**40,291**	**52,410**	**69,660**	**88,343**	**100,344**	**120,513**	**142,182**	**156,425**
Expenses:																				
Costs of Goods Sold	880	464	608	737	504	1,244	600	750	1,113	1,463	3,925	4,309	5,585	6,759	8,306	8,787	8,986	9,599	11,330	12,467
%COGS	30%	28%	28%	28%	28%	28%	25%	25%	25%	25%	25%	15%	14%	13%	12%	10%	9%	8%	8%	8%
Research and Development	4,269	758	1,605	1,481	240	889	245	256	277	288	1,066	8,500	8,585	8,671	8,758	8,845	8,934	9,023	9,113	9,204
%R&D																				
General and Administrative	11,248	2,998	3,060	2,704	3,098	11,473	1,725	1,800	1,950	2,025	7,500	7,650	7,803	7,959	8,118	8,281	8,446	8,615	8,787	8,963
%G&A																				
Sales and Marketing	3,084	1,712	2,690	2,717	360	1,333	1,725	1,800	1,950	2,025	7,500	8,617	8,790	8,966	15,000	15,300	15,606	15,918	16,236	16,561
	-																			
Impairment (goodwill and intangibles)	19,127																			
Total Expenses	38,608	5,933	7,963	7,638	4,201	25,735	4,295	4,606	5,290	5,800	19,991	29,076	30,763	32,354	40,182	41,213	41,972	43,155	45,467	47,196
Operating Income (Loss)	(34,247)	(5,128)	(7,079)	(6,506)	(2,401)	(21,115)	(1,814)	(1,521)	(748)	145	(3,937)	23	9,528	20,056	29,478	47,130	58,372	77,357	96,714	109,229
	-					-					-	-	-	-	-	-	-	-	-	-
Interest expense	(1,210)	(602)	(712)	(872)		(2,186)					-	-	-	-	-	-	-	-	-	-
Other income (expense)	89	298	15	10		322					-	-	-	-	-	-	-	-	-	-
Change in fair value of warrants	695	(264)	118	26		(119)					-	-	-	-	-	-	-	-	-	-
Loss on extinguishment of debt	(477)					-					-	-	-	-	-	-	-	-	-	-
Gain on Valeant	-			1,204		1,204					-	-	-	-	-	-	-	-	-	-
Total Other Income	**(903)**	**(568)**	**(578)**	**368**	**-**	**(779)**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Pretax Income	(35,150)	(5,697)	(7,657)	(6,138)	(2,401)	(21,894)	(1,814)	(1,521)	(748)	145	(3,937)	23	9,528	20,056	29,478	47,130	58,372	77,357	96,714	109,229
Prefrred Dividend		(995)	(995)																	
Taxes on income	13,181	-	-	-	-	-	-	-	-	-	-	-	-	1,003	2,358	4,713	7,005	10,056	14,507	16,384
Tax Rate														5%	8%	10%	12%	13%	15%	15%
GAAP Net Income (Loss)	(21,969)	(6,692)	(8,652)	(6,138)	(2,401)	(21,894)	(1,814)	(1,521)	(748)	145	(3,937)	23	9,528	20,056	27,120	42,417	51,367	67,301	82,207	92,844
Total comprehensive loss	(21,969)	(6,692)	(8,652)	(6,138)	(2,401)	(21,894)	(1,814)	(1,521)	(748)	145	(3,937)	23	9,528	20,056	27,120	42,417	51,367	67,301	82,207	92,844
GAAP-EPS	(0.61)	(0.78)	(0.76)	(0.51)	(0.09)	(2.14)	(0.07)	(0.04)	(0.02)	0.00	(0.12)	0.00	0.20	0.43	0.57	0.89	1.08	1.40	1.71	1.92
GAAP-EPS (Dil)	(0.66)	(0.78)	(0.44)	(0.51)	(0.07)	(1.80)	(0.05)	(0.03)	(0.01)	0.00	(0.09)	0.00	0.16	0.34	0.46	0.71	0.86	1.12	1.36	1.53
Wgtd Avg Shrs (Bas) -	43,436	8,631	11,375	12,062	26,527	14,649	26,554	41,580	41,622	41,663	37,855	45,521	46,957	47,146	47,334	47,524	47,714	47,906	48,097	48,290
Wgtd Avg Shrs (Dil) -	43,436	8,631	19,507	12,062	33,534	18,433	33,568	53,601	53,655	53,708	48,633	57,597	59,081	59,318	59,555	59,794	60,033	60,274	60,515	60,758

Source: Dawson James estimates.

Companies mentioned in this report:

Red Hill Bio (RDHL) Not Covered
Eli Lilly (LLY) Not Covered
Puma Biotechnology (PUMA) Not Covered
Salix Pharmaceuticals (SLXP) Not Covered

Important Disclosures:

Price Chart:

Price target and ratings changes over the past three years:
Initiated – Buy – January 3, 2019 – Price Target $1.0

Dawson James Securities, Inc. (the "Firm") is a member of the Financial Industry Regulatory Authority ("FINRA") and the Securities Investor Protection Corporation ("SIPC").

The Firm does not make a market in the securities of the subject company(s). The Firm has NOT engaged in investment banking relationships with JAGX in the prior twelve months, as a manager or co-manager of a public offering and has NOT received compensation resulting from those relationships. The Firm may seek compensation for investment banking services in the future from the subject company(s). The Firm has NOT received any other compensation from the subject company(s) in the last 12 months for services unrelated to managing or co-managing of a public offering.

Neither the research analyst(s) whose name appears on this report nor any member of his (their) household is an officer, director or advisory board member of these companies. The Firm and/or its directors and employees may own securities of the company(s) in this report and may increase or decrease holdings in the future. As of December 31, 2018, the Firm as a whole did not beneficially own 1% or more of any class of common equity securities of the subject company(s) of this report. The Firm, its officers, directors, analysts or employees may effect transactions in and have long or short positions in the securities (or options or warrants related to those securities) of the company(s) subject to this report. The Firm may effect transactions as principal or agent in those securities.

Analysts receive no direct compensation in connection with the Firm's investment banking business. All Firm employees, including the analyst(s) responsible for preparing this report, may be eligible to receive non-product or service specific monetary bonus compensation that is based upon various factors, including total revenues of the Firm and its affiliates as well as a portion of the proceeds from a broad pool of investment vehicles consisting of components of the compensation generated by investment banking activities, including but not limited to shares of stock and/or warrants, which may or may not include the securities referenced in this report.

Although the statements in this report have been obtained from and are based upon recognized statistical services, issuer reports or communications, or other sources that the Firm believes to be reliable, we cannot guarantee their accuracy. All opinions and estimates included in this report constitute the analyst's judgment as of the date of this report and are subject to change without notice.

Information about valuation methods and risks can be found in the "STOCK VALUATION" and "RISK ANALYSIS" sections of this report.

The securities of the company discussed in this report may be unsuitable for investors depending on their specific investment objectives and financial position. This report is offered for informational purposes only and does not constitute an offer or solicitation to buy or sell any securities discussed herein in any jurisdiction where such would be prohibited. Additional information is available upon request.

Ratings Definitions:

1) **Buy**: the analyst believes the price of the stock will appreciate and produce a total return of at least 20% over the next 12-18 months;
2) **Neutra**l: the analyst believes the price of the stock is fairly valued for the next 12-18 months;
3) **Sel**l: the analyst believes the price of the stock will decline by at least 20% over the next 12-18 months and should be sold.

The following chart reflects the range of current research report ratings for all companies followed by the analysts of the Firm. The chart also reflects the research report ratings relating to those companies for which the Firm has performed investment banking services.

	Company Coverage		Investment Banking	
Ratings Distribution	# of Companies	% of Total	# of Companies	# of Companies
Market Outperform (Buy)	46	90%	10	22%
Market Perform (Neutral)	5	10%	0	0%
Market Underperform (Sell)	0	0%	0	0%
Total	51	100%	10	20%

Analyst Certification:

The analyst(s) whose name appears on this research report certifies that 1) all of the views expressed in this report accurately reflect his (their) personal views about any and all of the subject securities or issuers discussed; and 2) no part of the research analyst's compensation was, is, or will be directly or indirectly related to the specific recommendations or views expressed by the research analyst in this research report; and 3) all Dawson James employees, including the analyst(s) responsible for preparing this research report, may be eligible to receive non-product or service specific monetary bonus compensation that is based upon various factors, including total revenues of Dawson James and its affiliates as well as a portion of the proceeds from a broad pool of investment vehicles consisting of components of the compensation generated by investment banking activities, including but not limited to shares of stock and/or warrants, which may or may not include the securities referenced in this report.