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INITIATION REPORT

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CytoSorbents Corporation (NASDAQ/CTSO)

July 11, 2019

BUY: A New Paradigm in Blood Purification - Sepsis

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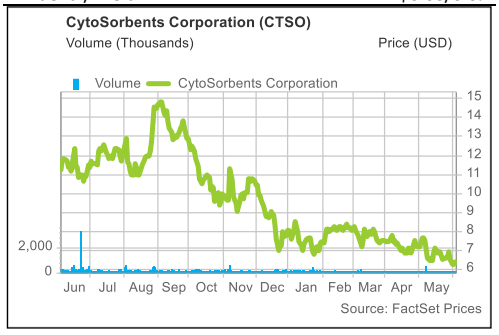
CytoSorbents is on the cutting edge of in-vivo blood purification technologies, targeting a range of indications from Sepsis, to cardiac and kidney injury, to name a few. With an approved product and revenues (principally in Europe) and a pivotal U.S. trial underway, we believe its still early days for the company.

Current Price	**$6.42**
Price Target	**$15.00**

Estimates	F2019E	F2020E	F2021E
Expenses ($000s)	$ 43,384	$ 48,374	$ 59,483
1Q March	$ 9,475	$ 11,126	$ 13,681
2Q June	$ 10,835	$ 11,610	$ 14,276
3Q September	$ 11,319	$ 12,577	$ 15,466
4Q December	$ 11,755	$ 13,061	$ 16,061
	F2019E	F2020E	F2021E
EPS (diluted)	$ (0.42)	$ (0.11)	$ 0.43
1Q March	$ (0.15)	$ (0.03)	$ 0.10
2Q June	$ (0.09)	$ (0.03)	$ 0.10
3Q September	$ (0.09)	$ (0.03)	$ 0.11
4Q December	$ (0.09)	$ (0.03)	$ 0.12
EBITDA/Share	($0.42)	($0.12)	$0.48
EV/EBITDA (x)	0.0	0.0	0.0
Stock Data			
52-Week Range	$6.03	-	$14.95
Shares Outstanding (mil.)			32.2
Market Capitalization (mil.)			$207
Enterprise Value (mil.)			$187
Debt to Capital			0%
Book Value/Share			$0.35
Price/Book			15.2
Average Three Months Trading Volume (K)			119
Insider Ownership			12.9%
Institutional Ownership			26.7%
Short interest (mil.)			7.5%
Dividend / Yield			$0.00/0.0%



Initiation - July 11, 2019 - Buy - Price Target $15.00

Investment Highlights

A Significant Market Opportunity. At present, there is a lack of viable treatments for the "cytokine storm" that can cause deadly inflammation and organ failure. Sepsis, trauma, lung injury, and pancreatitis are some of the common critical conditions with which these reactions are associated, accounting for nearly half of the deaths in the intensive care unit (ICU). CytoSorb's unique blood filtration cartridge has demonstrated proof of concept in thousands of treated patients in Europe. The simple, cost-effective, cartridge runs on virtually any platform, and as such represents a "plug and play" solution related to a multitude of inflammatory conditions from Sepsis to the cytokine storm seen with CAR-T therapies.

U.S. Expansion is Coming. CytoSorb was launched selectively in Europe (beginning in 2013) and today is available in 56 countries. Cytosorb, the company's flagship product, is in two U.S. based clinical trials, the REFRESH 2-AKI trial and the REMOVE endocarditis trial. The REFRESH trial in an n=400 patient study evaluating the safety and efficacy of CytoSorb in treating acute kidney injury after cardiac surgery complications. The complementary REMOVE Endocarditis trial, (n=250), is focused on valve replacement and bypass surgeries. The trial is almost fully enrolled with data expected by year end 2020. We assume commercialization of Cytosorb by 2021.

Universal Technology Application. The salt grain-sized porous beads that constitute the proprietary patented technology in CytoSorb have the capability of being modified in size to filter numerous small or large contaminants. Seven devices are in the pipeline that utilizes various bead sizes to address a wide range of other indications such as blood transfusions, drug overdose, hyperkalemia, IV contrast, and more. The millions of pores and channels together create an immense surface area that absorbs and removes targeted substances from the blood while safely allowing desirable bodily fluids to pass through unaffected.

Pharmaeconomic Benefit - Intensive care units tend to lose money, that could change. The expense of intensive care units (ICUs) in hospitals tends to exceed the revenues associated with treating patients. Patients, on average, spend 16 days in the ICU. Approximately 15% of a hospitals total budget is expensed for attempting to prolong the life of these critically ill patients. Mortality rates are high, with the leading cause of death being sepsis-induced organ failure. Each patient on mechanical ventilation costs about $5,000 per day. If Cytosorb can shorten a patient's stay in the ICU by just one day (we believe it can do much better than that), it creates significant savings for hospitals versus the cost of cartridge, (we assume a price point of $1,000 per cartridge and an average of five cartridges per treatment).

High Margins, High Hopes. The Cytosorb cartridge represents a low cost, high margin cartridge that can work on any number of platforms, easily fitting into the existing treatment paradigms. With an efficient, vertically integrated manufacturing model, the company expects blended gross margins to reach 80% at scale. By focusing on supplying cartridges (versus systems), CytoSorbents creates a high margin product opportunity closer to a specialty pharma business model versus medical technology. By developing a product that is consistent with the existing treatment paradigm, that is, the ability for a technician to connect a Cytosorb to a common dialysis or blood pump machine without extensive training, lowers the barrier for market penetration.

Safe and reliable blood transfusions. CytoSorbents' other technology, HemoDefend, is on track to improve the safety profile of blood transfusions. The pivotal human trial to support FDA approval can be expected to begin later this year (2H19). After in-vitro testing, the 25-volunteer trial will measure the ability of HemoDefend to filter non-infectious contaminants from the patients' blood. The anticipated success of this trial may place HemoDefend on the U.S. market before CytoSorb, creating a second pathway and associated catalysts.

Valuation. We use a series of therapeutic models across the various indications and geographies and project product revenues for the company out to the year 2030. In our U.S. therapeutic models, we apply a 30% risk cut (70% success probability) that both U.S. approvals and our market share forecasts can be realized. For us, valuation becomes an interesting question when we discuss the appropriate "r" risk-rate to use in our three model metrics, free cash flow to the firm (FCFF), Discounted EPS and Sum-Of-The-Parts (SOP) models, which are equal weighted, averaged and rounded to the nearest whole number. Typically for early-stage companies with no revenues, we use 30%, and for companies with established products and revenues, we use a lower 15%. Cytosorbents arguably is somewhere in the middle, as products are approved and selling in Europe but not yet in the U.S. If we select a conservative 30%, we drive a $9.00 price target. If we select a more aggressive 15%, we arrive at a $28.00 target. If we select a mid-point (22.5%), we derive a $15.00 target. Given their unique position of approval in Europe, established proof of concept and a product that works, we select the mid-point of 22.5% and set our target for CytoSorbents at $15.00.

Risk. Market risks, Regulatory risks, Financial risks and Commercialization risks

A special thanks to Jesse Clark - University of Florida, Chase Shea - Georgetown University, Alex Levy - University of Wisconsin-Madison , Ryan Swiezbin- Quinnipiac University, Tucker Kolbert - University of Wisconsin -Madison, Clayton Berger – Skidmore College for their research contributions to this report.

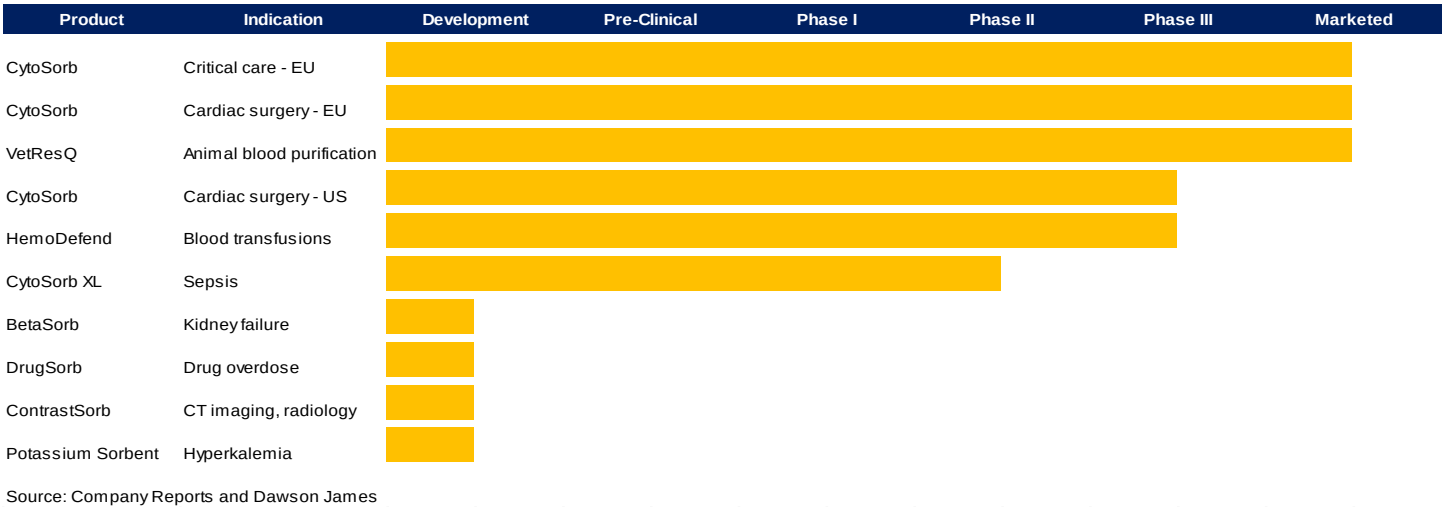
Exhibit 1. Upcoming catalysts

Product	Geography	Indication	Event	Timeline	Impact
HemoDefend	U.S.	Blood Transfusion	Pivotal trial initiation for FDA approval support	3Q2019	++
CytoSorb	Europe	Cardiac surgery	Enrollment completion for REMOVE trial	3Q2019	++
CytoSorb	U.S.	Cardiac surgery	Pivotal REFRESH II trial topline data	4Q2019	+++
CytoSorb	U.S.	Cadiac surgery	Enrollment completion for REFRESH II	2020	++
CytoSorb	U.S.	Sepsis	Regulatory approval and commercial launch	2021	+++
CytoSorb	U.S.	Cardiac surgery	Regulatory approval and commercial launch	2021	+++

Stock Significance Scale: + of moderate importance; ++ higher level; +++ very important

Source: Company reports and Daw son James Forecasts

Exhibit 2. CytoSorbents pipeline



Source: Company Reports and Dawson James

Company Overview

CytoSorbents is an industry leader in critical care immunotherapy, driven by the development and commercialization of their flagship purification technology, CytoSorb. The revolutionary filtration cartridge is designed to prevent or treat organ failure in deadly illnesses and cardiac surgery complications. Presently, organ failure is the leading causes of death in the intensive care unit (ICU) at hospital worldwide, with few viable options to improve clinical outcomes. CytoSorb has established “Proof of Concept – POC," as the product has been commercialized in Europe and treated thousands of patients. CytoSorb has been used in over 60,000 treatments to date.

The CytoSorbents technologies utilize biocompatible, highly porous polymer beads that remove contaminants from blood and other bodily fluids by way of entrapment among millions of pores and channels. In a single CytoSorb cartridge, the combined surface area of the salt grain-sized beads amounts to over 700 football fields. The size of these pores and channels can be easily manipulated to filter small substances or large antibodies. Applications of the platform technology are numerous. CytoSorb is now in two Phase 3 U.S. pivotal trials cardiac surgery indications. CytoSorbents has commercialized a similar product for the U.S. veterinary market, called VetResQ, offering blood purification for domestic pets suffering from infections or sepsis-induced conditions. A practical application of this sorbent, called HemoDefend, is set to begin pivotal human trial later this year. This platform intends to reduce reactions and improve the quality and safety of blood transfusions and blood products.

CytoSorbents utilizes a hybrid sales platform, combining high margin direct sales and low margin distribution sales to reach as many global markets as possible. The strategy currently focuses on the German market, given its profile as the third largest medical device market in the world. Thus, 62% of total CytoSorb sales come from hospitals in Germany. Another 55 countries constitute the rest of the company’s current revenues. Of course, we look for exposure to the U.S. markets based on a positive outcome in the current U.S. trials.

Senior Management

Phillip P. Chan, MD, Ph.D., CEO. Dr. Phillip Chan is the CEO and President of CytoSorbents Corporation. Prior to CytoSorbents, Dr. Chan led healthcare and life science investments as Partner for the $80M NJTC Venture Fund, one of the top performing and largest early-stage investors in the greater New York region. He was responsible for numerous investments in therapeutics, medical devices, and diagnostics. Dr. Chan also co-founded Andrew Technologies, a venture-backed medical device company commercializing its FDA approved HydraSolve™ advanced lipoplasty system in the U.S. Dr. Chan received Board-certification in internal medicine, having completed his residency at Harvard Medical School at the Beth Israel Deaconess Medical Center. Dr. Chan received his MD/Ph.D. from Yale University School of Medicine and his BS in cell and molecular biology from Cornell University. In 2012, Dr. Chan was named an Ernst & Young New Jersey Entrepreneur-of-the-Year finalist.

Kathleen Bloch, MBA, CPA, CFO. Ms. Bloch has more than 20 years of executive financial experience at both public and private companies. From 2008 to 2010, she served as the Chief Operating Officer of PC Group, Inc., where she was hired as CFO in 2007. Prior to this, Ms. Bloch managed the day-to-day operations for The Silverman Group, a real estate and investment company. For ten years prior she was employed by Silver Line Building Products Corporation, a leading privately-held manufacturer of vinyl windows. She served as CFO from 1999 until 2006 when the company was acquired by Andersen Corporation, a leading manufacturer of windows. She holds a Master of Business Administration degree and a Bachelor of Science Accounting degree from LaSalle University.

Eric Mortensen, MD, Ph.D., CMO. Dr. Mortensen has more than 20 years of clinical trial experience most recently as Vice President & Therapeutic Area Clinical Head for Inflammation and Immunology at Pfizer from 2014 to 2016. As the Clinical Inflammation Development Strategy Lead and co-chair for Inflammation's Therapeutic Area Strategy Team (TAST), he ensured an integrated approach to the development of medicines across the different indications within Inflammation and Immunology. Dr. Mortensen previously held positions of increasing responsibility as the Vice President, Global Medicine Development Group Global Lead for Xeljanz and Assistant Vice President and Global Therapeutic Area Director for Enbrel. Previously, Dr. Mortensen was at GlaxoSmithKline and Merck. Dr. Mortensen received an A.B. in Biochemistry from Harvard College, an M.D. from the Harvard University and Massachusetts Institute of Technology Division of Health Sciences and Technology (HST), and a Ph.D. in Biophysics at the Harvard Graduate School of Arts and Sciences. Dr. Mortensen completed an internship and residency in Internal Medicine at the Massachusetts General Hospital and a fellowship in Gastroenterology at the University of Michigan Medical Center, Ann Arbor.

Investment Summary

Bull Case. CytoSorb represents a high margin (low cost) cartridge that can operate on virtually any platform as a unique blood filtration device, one that is capable of removing inflammatory cytokines. By adjusting the cartridges' pore sizes, the cartridge itself becomes a platform technology that is applicable to a wide range of indications from sepsis to the cytokine storm, that typically results following CAR-T therapy. The initial focus has been on treating sepsis with an eye towards the treatment of the complications related to cardiac surgery (U.S.). With sepsis-induced organ failure being the leading cause of death in the intensive care unit, there is a significant unmet need for treatment that could amount to a $20B market worldwide. Just a small piece of this market can translate into significant revenues, this coupled with the high margin nature of the cartridge has the potential to make Cytosorbents a very profitable company. Two major near-term product catalysts are approaching on the horizon, the potential FDA-approval of CytoSorb in the U.S. by 2021 and in the interim, HemoDefend, a blood (donation/transfusion) purification technology by 2020. Bulls will also recognize that medical technology tends to be dominated by a few major players. A strong history of mergers and acquisitions has been evident in the industry. While we have no ability to forecast that Cytosorbents may be acquired, we acknowledge that the potential exists.

Bear Case. CytoSorbents cartridge has now been on the market in Germany for several years, and sales have been slow to build. While the product is now being marketed in some 50 plus countries, it has yet to reach any meaningful market share penetrations. Bears will argue that the market analysis of the commercial opportunity is not correct or that it requires years of effort and ten's of millions of promotional dollars to establish a new treatment paradigm. In terms of the U.S. marketplace, the current pivotal trials, REFRESH 2-AKI trial, and the REMOVE endocarditis trial are not de-risked. The odds have typically not been positive in demonstrating efficacy in these complex indications with the associated multiple comorbidities.

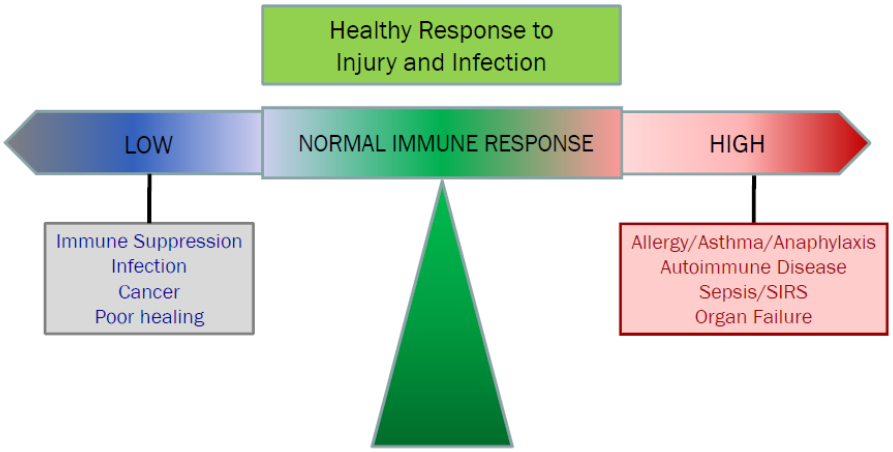
Our Take. We find the established data behind Cytosorb's efficacy in sepsis and a range of related indications as compelling. Our positive outlook is based on the thousands of patient-based experiences that suggest Cytosorb is a powerful new tool in dealing with the sometimes deadly effects, or after-affects, of the inflammatory response. The sepsis and its related indications is in great need of a disruptive technology to fill the treatment gap between weak anti-inflammatories and overly strong immunosuppressants. We see Cytosorb as ideally positioned to fill that gap. The "big" catalysts ahead, beyond seeing a quarterly sales revenue progression, is entry into the U.S. marketplace. We see the two trials, REFRESH 2-AKI and REMOVE endocarditis, as smartly designed with a high probability of success. A positive outcome, in our opinion, opens the U.S. door for a wide range of applications. Over-time we expect to see additional trials in other new indications, possibly CAR-T in the future. We also see the company's other product, HemoDefend, as potentially getting to the U.S. marketplace ahead of Cytosorb. Cytosorbents is currently partnered with two of the biggest players in the marketplace today (Fresenius – FMS: not rated and Terumo – TRUMF: not rated). We see a good chance that Cytorsobents' disruptive technology drives one of the major players to acquire the company.

Financials. CytoSorbents reported 1Q19 revenues to be $4.6M, up 18% from the prior period a year earlier. At the end of the first quarter, the company has just under $20M in cash. We may see the company raise capital one more time, prior to becoming cash flow positive.

The Cytokine Storm. Cytokines are important proteins used in the body for cell signaling. While normal amounts of cytokine help regulate the immune system, a little too much can have negative effects; autoimmune disorders are commonly caused by excess amounts of cytokines. When people are subjected to life-threatening conditions, however, their bodies may produce mass amounts of cytokines. These extreme productions of cytokines, called cytokine release syndrome (CRS) or cytokine storm, can lead to a massive uncontrolled systemic inflammatory response syndrome (SIRS). Symptoms of SIRS include severe inflammation, cell death, organ failure, and often death. While the initial cause of the cytokine storm may be treatable, the reaction of the body to the infection or cancer is hard to control. In fact, nearly half of all deaths in the intensive care unit (ICU) are caused by the cytokine storm, and not by the initial cause. Cytokine storm kills more people in the U.S. than heart attacks, strokes, or any type of cancer.

Supportive care therapies, "life support" machines designed to replace the function of failed organs, are the current standard of care. However, these machines can be very pricy; 20% of a hospital's overall budget can be spent on critical care medicine, and often causes financial losses for the hospital. Reducing even just one day in the ICU could save $2,000-4,000 per patient per day.

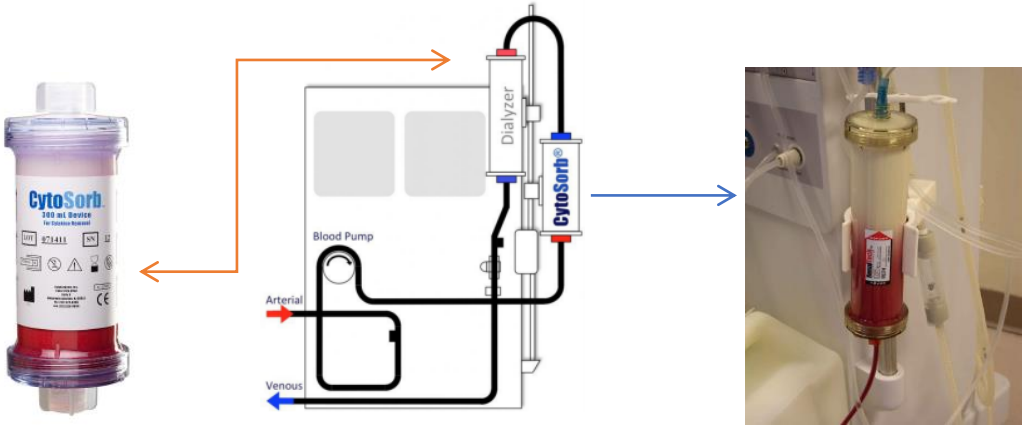
Exhibit 3. Immune System Balance is Important. Homeostasis is vital to living organisms in order to regulate internal conditions. Too much or too little of anything can cause disastrous effects.



Source: CytoSorbents

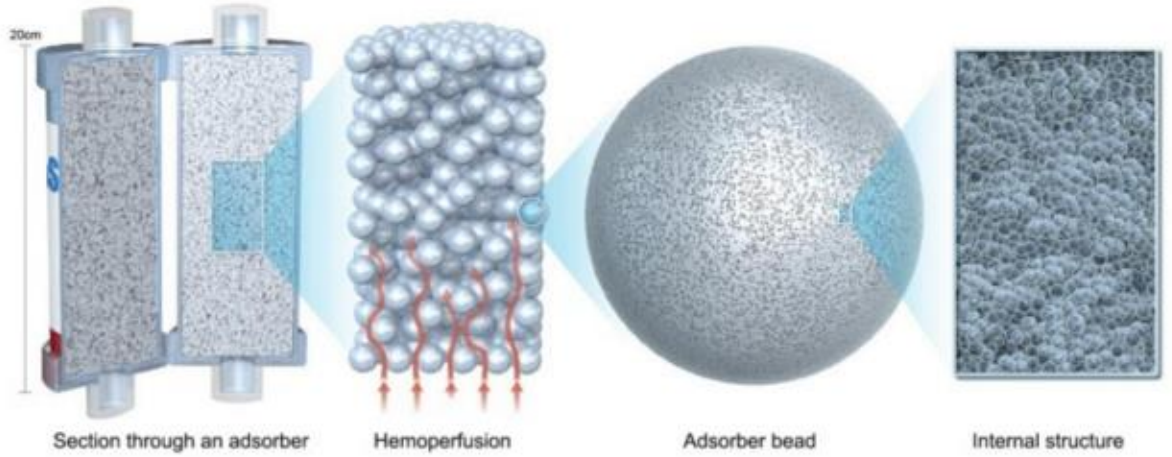
CytoSorb. CytoSorbents' flagship product, CytoSorb, is designed to reduce the effects of the cytokine storm. CytoSorb is a cartridge that contains CytoSorbents' proprietary blood compatible porous polymer beads. These state-of-the-art beads act like tiny sponges and absorb harmful substances in the blood, which includes the excess amounts of cytokines. One CytoSorb device can treat a patient's entire blood volume approximately 70 times in a single 12-hour treatment. If the device turns out successful, CytoSorb could be revolutionary in medicine for improving patient outcome and survival from the cytokine storm.

Exhibit 4. CytoSorb. CytoSorb was designed to be compatible with existing infrastructures in hospitals, making it relatively cheap and easy to use. This diagram shows where the device could be connected to in a standard dialysis machine.



Source: CytoSorbents

Exhibit 5. CytoSorbent's proprietary technology. The diagram below shows a magnified version of one of the many beads that are in the CytoSorb device and how the device works. In reality, each bead is about the size of a grain of salt.



Source: CytoSorbents

Indications. A patient can develop CRS and SIRS in many conditions, including sepsis, acute respiratory distress syndrome (ARDS), burn injury, trauma, pancreatitis, influenza, and surgery. Patients in serious conditions end up having to rely on life-support machines to stay alive, in the hopes that their bodies will heal on their own. However, staying on these machines could cost a patient $2,000-$3,000 a day with a risk of death of one in every three patients. In the U.S. alone, nearly 1% of its GDP, or about $82 billion, is spent on critical care. This gives CytoSorbents a $20 billion opportunity in critical care if CytoSorb is approved, and can reduce the need for life-support machines which could save significant healthcare costs.

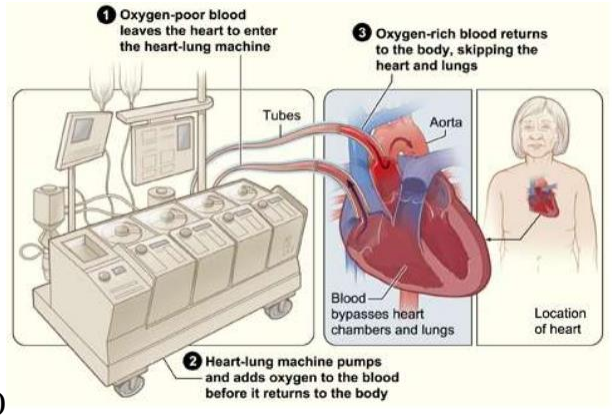
Exhibit 6. Indications. Millions of people are admitted to the ICU every year with the following deadly inflammatory conditions.

Source: CytoSorbents

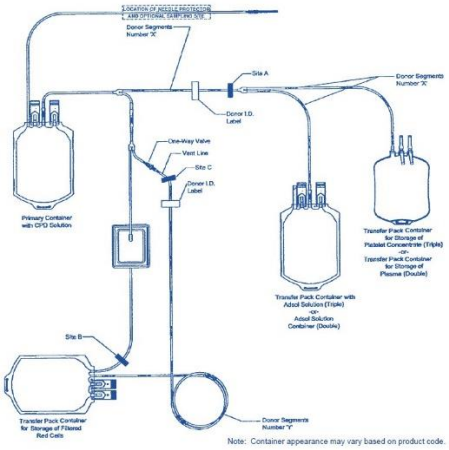
Sepsis. When a person has an infection, his or her body may try to fight the infection by releasing cytokines all over the body, which is sepsis. The infection itself may be highly treatable with antibiotics, but it is how the body reacts to the infection that could be very difficult to control. Some patients may go into septic shock, in which blood pressure drops dramatically and may lead to death. Approximately accounting for 10-20% of all ICU admissions, sepsis is the most common syndrome seen, and one of the most deadly; severe sepsis has a mortality rate of about 25-35%, and sepsis shock has a mortality rate of 40-50%. In the U.S. and E.U. combined, there are more than 2.5 million new cases of sepsis annually. Globally, there are around 18 million new cases per year. While sepsis is more common (and dangerous) in those who have weakened immune systems, patients over the age of 65 admitted into the ICU are especially vulnerable; this population accounts for 2/3 of patients hospitalized with sepsis and the majority of sepsis deaths.

Cardiac Surgery. Approximately one million cardiac surgeries are performed annually in the U.S. and E.U. combined, for several heart complications and conditions. However, many risks are involved with the surgery, including the onset of cytokine storm and of hemolysis, or the release of free hemoglobin. These risks can lead to post-operative complications such as severe inflammation and organ failure and possibly death. Currently, leukoreduction filters are used to attempt to indirectly reduce cytokine levels by capturing the leukocytes that produce cytokines. However, this is an inefficient and suboptimal approach—studies have shown that leukoreduction did not remove infectivity or reduce the cytokine storm.

Exhibit 7. Heart-lung machine and leukoreduction. Sometimes, during cardiac surgery, the heart needs to be stopped in order for doctors to properly do a procedure. (A) Shows the machine that can temporarily take over the functions of the heart and lungs of a patient during these surgeries. This technique, as shown in (B) is called a cardiopulmonary bypass (CPB). The CytoSorb device was designed so that it can be installed into standard heart-lung machines within minutes and without the need for additional pumps or machines.



(A)

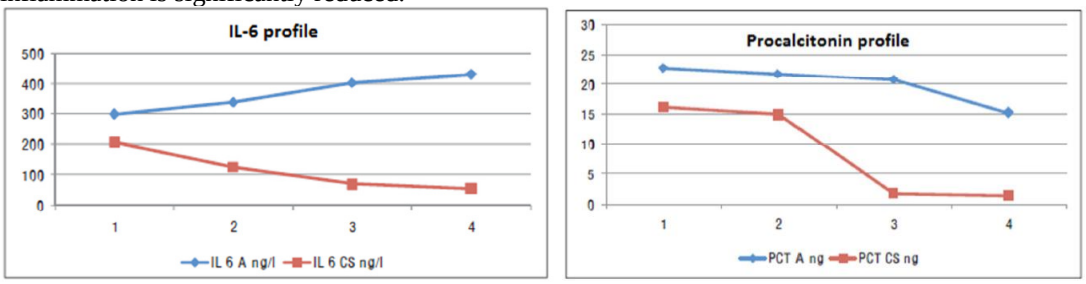


(B)

Source: CytoSorbents and National Library of Medicine (NLM) – National Institutes of Health (NIH)

CytoSorb has potential to replace leukoreduction. The device can be used either during or after cardiac surgery to prevent the inflammation, and organ dysfunctions and failures. CytoSorb has been clinically proven to reduce the deadly cytokine storm during open heart surgery with over 5,000 patients. CytoSorbents completed the U.S. based REFRESH I trial in 2017, which consisted of a 46-patient, eight center study to evaluate the safety and efficacy of CytoSorb intra-operatively. This is very good news for CytoSorb— if approved, the device might have a $500 million - $1 billion addressable markets in the U.S. and E.U.

Exhibit 8. Intra-op usage of CytoSorb. Results from the study showed that when CytoSorb is used during cardiac surgery, post-op inflammation is significantly reduced.



Source: CytoSorbents

Cancer Immunotherapy. CytoSorb has the potential to serve as rescue treatment for patients who develop uncontrolled CRS in activated T-cell or CAR T-cell cancer immunotherapy. Cancer cachexia is another condition that is seen in cancer patients with high levels of cytokines and other inflammatory mediators. Cachexia occurs in most cancers, with symptoms that include rapid, uncontrolled weight loss, anorexia, and physical debilitation. Because of this condition, most patients lose the strength to tolerate cancer treatments such as radiation and chemotherapy. CytoSorb could remove the molecules that drive cachexia from the blood, which could be revolutionary in cancer treatment.

Other Platforms Too. CytoSorbents' proprietary biocompatible, highly porous polymer beads can be manipulated so that its millions of pores and channels can be smaller or larger, depending on the size of the molecules that CytoSorbents wants to target. For example, in CytoSorb, the pores and channels are just large enough to absorb cytokines and free hemoglobin, both of which are larger molecules.

Exhibit 9. HemoDefend. One of CytoSorbents' developing technologies, HemoDefend is nearing the start of a pivotal U.S. trial.

Source: CytoSorbents

HemoDefend. There has been an ongoing controversy on whether there is a difference between "old" blood and "new" blood or blood that has been stored for some time in a refrigerated compartment versus blood that has been freshly donated by a person. Although current studies show contradicting results (independent studies were highly varied in approach), it is undisputed that biological changes occur during RBC storage, although unknown if they are beneficial/harmless or detrimental changes. Whether or not aged blood is bad, HemoDefend is still advantageous when storing donated blood. Not only will it keep donated blood fresh and extend the shelf-life of blood, but it will also remove the many contaminants that may be present in donated blood, or from the changes, RBCs undergo while in storage. This is to minimize the current 1-5% risk chance patients have of developing a transfusion reaction, which could be as mild as a fever to as severe as death.

The HemoDefend technology can be implemented in two ways; as an in-line filter between the blood bag and the patient during transfusion, or in an approach called "Beads in a Bag." Beads in a Bag is CytoSorbents' innovative, patent-pending technology that will purify blood during the entire refrigerated storage period. CytoSorbents' biocompatible beads are perfect for this use for several reasons: the beads can have extended contact with blood without causing damage to the RBCs, they are neutrally buoyant and will suspend in blood so that the blood storage bag does not need to be mixed, and during transfusion, an integrated filter will keep the beads in the bag. HemoDefend won't require any extra machine, electricity, energy source, or any other manipulation to be used, so it won't cost much to possibly save a life.

BetaSorb. Still, in development, BetaSorb aims to aid in the treatment of chronic kidney disease (CKD), which is when the kidneys fail to perform any of their normal functions. Nearly 20 million people in the U.S. suffer from these conditions. In 2017, $64 billion was spent in the U.S. for the care of almost 900,000 patients with end-stage kidney failure. The current standard of care is hemodialysis; a procedure in which wastes, salts, and fluid is filtered out of a patient's blood by use of a machine (the machine basically takes over the kidney's function since the kidney is no longer fully functional). BetaSorb will improve the process of hemodialysis by targeting harmful molecules that hemodialysis fails to clear, like Beta2-microglobulin (β2M). Reduced levels of this protein will lead to reductions in debilities like amyloidosis, hospital stays, and mortality rates.

DrugSorb. Another technology that is still in development, DrugSorb will aim to remove any drug or chemical from the blood, from a drug overdose, drug toxicity, toxic chemical exposure, etc. Because of CytoSorbents' highly flexible beads, DrugSorb could be configured to target specific agents. It has demonstrated extremely high single pass removal efficiency of a number of different drugs that exceeds the extraction capability of hemodialysis or other filtration technologies. It is similar in action to activated charcoal hemoperfusion cartridges that have been available for many years, but has the advantage of having inherent biocompatibility and hemocompatibility without coatings.

ContrastSorb. ContrastSorb is designed to remove intravenous radiocontrast, or "IV contrast", that is administered during interventional radiology procedures (e.g., coronary angiograms for heart disease) and computed tomography or computer axial tomography imaging (i.e., CT or "CAT" scans) that can cause kidney failure in high risk patients (e.g. those with pre-existing kidney disease, diabetes, hypertension, congestive heart failure, and old age).

Key Partnerships

Fresenius Medical Care. Fresenius is the largest dialysis company in the world. CytoSorbents gave Fresenius exclusive distribution of CytoSorb in critical care in France, Sweden, Norway, Finland, Denmark, and Poland. CytoSorb is highly compatible with the Fresenius Multifiltrate, and the two technologies were used together successfully thousands of times.

Terumo Cardiovascular. A subsidiary of one of the world's leading medical device manufacturers, Terumo Corp. Terumo Cardiovascular focuses on medical devices for cardiac and vascular surgery. The partnership with CytoSorbents grants exclusive rights for CytoSorb distribution in France, Sweden, Denmark, Norway, Finland, and Iceland for cardiac surgery applications. The integration of CytoSorb with Terumo's heart-lung machine platform gives surgical teams the ability to safely reduce dangerous inflammatory mediators intra-operatively. Over 70,000 heart surgeries are performed per year across the indicated territory.

BioCon. CytoSorb has a strategic partnership with Biocon, India's largest biotechnology company. Biocon will have exclusive commercialization rights for CytoSorb in India. The two companies will focus on the treatment of sepsis, which in India, there are more than 1 million new cases of severe sepsis annually, which accounts for 25% of patients admitted into the ICU. Mortality for these patients was as high as 46% in patients with septic shock, compared to the 17.8% in patients who did not develop sepsis at all. BioCon is developing critical care antibiotics to treat sepsis infection. This treatment is compatible with CytoSorbents' CytoSorb, and so treatment for sepsis will include both components, which will be the most comprehensive solution for sepsis management in the market.

Dr. Reddy's Laboratories. As an integrated pharmaceutical company, Dr. Reddy's holds exclusive rights to CytoSorb distribution in South Africa for intensive care, cardiac surgery, and other indications. The multi-year deal includes annual minimum purchase agreements. Dr. Reddy's has an established reputation in South Africa, where there are 55 million people and a major public health issue of HIV/AIDS and malaria. These patients are at a heightened risk for contracting sepsis.

Exhibit 10. Other potential partnerships. The variability of CytoSorb gives CytoSorbents an opportunity to make partnerships with many different types of companies.

Source: CytoSorbents

Modeling Assumptions

1. We assume continued steady growth for Cytosorb in the current key EU direct sales countries of Germany, Austria and Switzerland.
2. We assume a selling price per cartridge of $1,000 for direct sales and $600 for distribution sales. We estimate that each patient will require an average of five units (CytoSorb cartridges) for sepsis treatment and three units for cardiac treatment.
3. We conservatively assume that CytoSorb can achieve a ten percent market share of the market in Germany, Austria and Switzerland, and 3% of the market in the rest of the EU by 2030.
4. Our model includes CytoSorb revenues in the U.S. for cardiac surgery and sepsis beginning in 2021 upon commercialization. To these revenues, we apply a 70% probability of success (or 30% risk cut).

Exhibit 11. CytoSorb sepsis EU direct sales (Germany, Austria, and Switzerland)

CytoSorb - Distributor (Rest of EU)	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
EU population (Germany, Austria and Switzerland excluded)	408,580,205	409,244,211	409,908,351	410,572,616	411,237,001	411,901,499	412,566,103	413,230,806	413,895,600	414,560,479	415,225,435	415,890,462	416,555,551
Critical care population (Sepsis included)	2,083,759	2,087,145	2,090,533	2,093,920	2,097,309	2,100,698	2,104,087	2,107,477	2,110,868	2,114,258	2,117,650	2,121,041	2,124,433
Percent of patients with access to hospitals with Cytosorb	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
Total patients	**833,503.62**	**834,858.19**	**836,213.04**	**837,568.14**	**838,923.48**	**840,279.06**	**841,634.85**	**842,990.84**	**844,347.02**	**845,703.38**	**847,059.89**	**848,416.54**	**849,773.32**
Market penetration	0.2%	0.3%	0.5%	0.5%	0.8%	1.0%	1.5%	2.0%	2.5%	3.0%	3.0%	3.0%	3.0%
Total addressable patients	1,667	2,505	4,181	4,188	6,711	8,403	12,625	16,860	21,109	25,371	25,412	25,452	25,493
Estimated units per patient	5	5	5	5	5	5	5	5	5	5	5	5	5
Total filter needed	8,335	12,523	20,905	20,939	33,557	42,014	63,123	84,299	105,543	126,856	127,059	127,262	127,466
Cost of therapy	$ 618	$ 624	$ 631	$ 637	$ 643	$ 650	$ 656	$ 663	$ 669	$ 676	$ 683	$ 690	$ 697
Change in price	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue ('000)	**$ 5,153**	**$ 7,819**	**$ 13,183**	**$ 13,336**	**$ 21,587**	**$ 27,297**	**$ 41,422**	**$ 55,871**	**$ 70,651**	**$ 85,766**	**$ 86,763**	**$ 87,771**	**$ 88,790**
Risk factor													
Total revenue ('000)	**$ 5,153**	**$ 7,819**	**$ 13,183**	**$ 13,336**	**$ 21,587**	**$ 27,297**	**$ 41,422**	**$ 55,871**	**$ 70,651**	**$ 85,766**	**$ 86,763**	**$ 87,771**	**$ 88,790**

Source: Dawson James estimates

Exhibit 12. CytoSorb sepsis EU sales by distributorship (excluding Germany, Austria, and Switzerland)

CytoSorb - Distributor (Rest of EU)	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
EU population (Germany, Austria and Switzerland excluded)	408,580,205	409,244,211	409,908,351	410,572,616	411,237,001	411,901,499	412,566,103	413,230,806	413,895,600	414,560,479	415,225,435	415,890,462	416,555,551
Critical care population (Sepsis included)	2,083,759	2,087,145	2,090,533	2,093,920	2,097,309	2,100,698	2,104,087	2,107,477	2,110,868	2,114,258	2,117,650	2,121,041	2,124,433
Percent of patients with access to hospitals with Cytosorb	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
Total patients	**833,503.62**	**834,858.19**	**836,213.04**	**837,568.14**	**838,923.48**	**840,279.06**	**841,634.85**	**842,990.84**	**844,347.02**	**845,703.38**	**847,059.89**	**848,416.54**	**849,773.32**
Market penetration	0.2%	0.3%	0.5%	0.5%	0.8%	1.0%	1.5%	2.0%	2.5%	3.0%	3.0%	3.0%	3.0%
Total addressable patients	1,667	2,505	4,181	4,188	6,711	8,403	12,625	16,860	21,109	25,371	25,412	25,452	25,493
Estimated units per patient	5	5	5	5	5	5	5	5	5	5	5	5	5
Total filter needed	8,335	12,523	20,905	20,939	33,557	42,014	63,123	84,299	105,543	126,856	127,059	127,262	127,466
Cost of therapy	$ 618	$ 624	$ 631	$ 637	$ 643	$ 650	$ 656	$ 663	$ 669	$ 676	$ 683	$ 690	$ 697
Change in price	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue ('000)	**$ 5,153**	**$ 7,819**	**$ 13,183**	**$ 13,336**	**$ 21,587**	**$ 27,297**	**$ 41,422**	**$ 55,871**	**$ 70,651**	**$ 85,766**	**$ 86,763**	**$ 87,771**	**$ 88,790**
Risk factor													
Total revenue ('000)	**$ 5,153**	**$ 7,819**	**$ 13,183**	**$ 13,336**	**$ 21,587**	**$ 27,297**	**$ 41,422**	**$ 55,871**	**$ 70,651**	**$ 85,766**	**$ 86,763**	**$ 87,771**	**$ 88,790**

Source: Dawson James estimates

Exhibit 13. CytoSorb U.S. sales for cardiac surgery

CytoSorb Cardiac Surgery US	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
US population	327,296,502	329,587,577	331,894,690	334,217,953	336,557,479	338,913,381	341,285,775	343,674,775	346,080,499	348,503,062	350,942,583	353,399,182	355,872,976
Cardiac surgery	1,009,027	1,012,054	1,015,090	1,018,136	1,021,190	1,024,254	1,027,326	1,030,408	1,033,499	1,036,600	1,039,710	1,042,829	1,045,957
Market penetration				0.1%	0.2%	0.3%	0.4%	0.5%	1.2%	1.2%	1.2%	1.2%	1.2%
Total addressable patients				1,018	2,042	3,073	4,109	5,152	12,402	12,439	12,477	12,514	12,551
Estimated units per patient				3	3	3	3	3	3	3	3	3	3
Total filter needed				3,054	6,127	9,218	12,328	15,456	37,206	37,318	37,430	37,542	37,654
Cost of therapy				$ 2,500	$ 2,513	$ 2,525	$ 2,538	$ 2,550	$ 2,563	$ 2,576	$ 2,589	$ 2,602	$ 2,615
Change in price				1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue ('000)				**$ 7,636**	**$ 15,394**	**$ 23,277**	**$ 31,284**	**$ 39,419**	**$ 95,364**	**$ 96,128**	**$ 96,899**	**$ 97,675**	**$ 98,458**
Risk factor				30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Total revenue ('000)				**$ 5,345**	**$ 10,776**	**$ 16,294**	**$ 21,899**	**$ 27,593**	**$ 66,755**	**$ 67,290**	**$ 67,829**	**$ 68,373**	**$ 68,921**

Source: Dawson James estimates

Exhibit 14. CytoSorb EU sales for cardiac surgery

CytoSorb Cardiac Surgery EU	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Cardiac surgery	1,509,018	1,512,036	1,515,060	1,518,090	1,521,126	1,524,169	1,527,217	1,530,271	1,533,332	1,536,399	1,539,471	1,542,550	1,545,635
Market penetration	0.09%	0.1%	0.2%	0.3%	0.4%	0.5%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Total addressable patients	1,358	1,512	3,030	4,554	6,085	7,621	9,163	10,712	10,733	10,755	10,776	10,798	10,819
Estimated units per patient	3	3	3	3	3	3	3	3	3	3	3	3	3
Total filter needed	4,074	4,536	9,090	13,663	18,254	22,863	27,490	32,136	32,200	32,264	32,329	32,394	32,458
Cost of therapy	$ 500	$ 500	$ 500	$ 503	$ 505	$ 508	$ 510	$ 513	$ 515	$ 518	$ 520	$ 523	$ 526
Change in price	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue ('000)	**$ 2,037**	**$ 2,268**	**$ 4,545**	**$ 6,866**	**$ 9,218**	**$ 11,604**	**$ 14,022**	**$ 16,474**	**$ 16,589**	**$ 16,705**	**$ 16,822**	**$ 16,940**	**$ 17,059**
Risk factor													
Total revenue ('000)	**$ 2,037**	**$ 2,268**	**$ 4,545**	**$ 6,866**	**$ 9,218**	**$ 11,604**	**$ 14,022**	**$ 16,474**	**$ 16,589**	**$ 16,705**	**$ 16,822**	**$ 16,940**	**$ 17,059**

Source: Dawson James estimates

Exhibit 15. CytoSorb U.S. sales for sepsis

CytoSorb Sepsis US	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
US population	327,296,502	329,587,577	331,894,690	334,217,953	336,557,479	338,913,381	341,285,775	343,674,775	346,080,499	348,503,062	350,942,583	353,399,182	355,872,976
Severe sepsis patients	981,890	988,763	995,684	1,002,654	1,009,672	1,016,740	1,023,857	1,031,024	1,038,241	1,045,509	1,052,828	1,060,198	1,067,619
Market penetration				0.1%	0.2%	0.5%	1.0%	2.0%	2.1%	2.3%	2.5%	2.7%	3.0%
Total addressable patients				1,003	2,019	5,084	10,239	20,620	21,803	24,047	26,321	28,625	32,029
Estimated units per patient				5	5	5	5	5	5	5	5	5	5
Total filter needed				5,013	10,097	25,419	51,193	103,102	109,015	120,234	131,603	143,127	160,143
Cost of therapy				$ 2,500	$ 2,525	$ 2,550	$ 2,576	$ 2,602	$ 2,628	$ 2,654	$ 2,680	$ 2,707	$ 2,734
Change in price				1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue ('000)				**$ 12,533**	**$ 25,494**	**$ 64,824**	**$ 131,860**	**$ 268,222**	**$ 286,441**	**$ 319,076**	**$ 352,742**	**$ 387,464**	**$ 437,865**
Risk factor				30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Total revenue ('000)				**$ 8,773**	**$ 17,846**	**$ 45,376**	**$ 92,302**	**$ 187,755**	**$ 200,508**	**$ 223,353**	**$ 246,919**	**$ 271,225**	**$ 306,505**

Source: Dawson James estimates

Valuation. We use a series of therapeutic models across the various indications and geographies and project product revenues for the company out to the year 2030. In our U.S. therapeutic models, we apply a 30% risk cut (70% success probability) that both U.S. approvals and our market share forecasts can be realized. For us, valuation becomes an interesting question when we discuss the appropriate "r" risk-rate to use in our three model metrics, free cash flow to the firm (FCFF), Discounted EPS and Sum-Of-The-Parts (SOP) models, which are equal weighted, averaged and rounded to the nearest whole number. Typically for early-stage companies with no revenues, we use 30%, and for companies with established products and revenues, we use a lower 15%. Cytosorbents arguably is somewhere in the middle, as products are approved and selling in Europe but not yet in the U.S. If we select a conservative 30%, we drive a $9.00 price target. If we select a more aggressive 15%, we arrive at a $28.00 target. If we select a mid-point (22.5%), we derive a $15.00 target. Given their unique position of approval in Europe, established proof of concept and a product that works, we select the mid-point of 22.5% and set our target for CytoSorbents at $15.00.

Exhibit 16. FCFF Model

Average $	15

Price Target $	15
Year	2019

DCF Valuation Using FCF (mln):

units ('000)	2018A	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
EBIT	(17,830)	(13,372)	(3,857)	15,444	42,664	85,228	150,317	254,761	318,004	359,202	389,831	409,140	405,663
Tax Rate	0%	5%	8%	10%	12%	15%	18%	21%	24%	28%	33%	33%	33%
EBIT (1-t)	(17,830)	(12,703)	(3,549)	13,899	37,544	72,444	123,260	201,261	241,683	258,625	261,186	274,124	271,794
CapEx	(493)	(543)	(597)	(657)	(722)	(794)	(874)	(961)	(1,057)	(1,163)	(1,279)	(1,407)	(1,548)
Depreciation	391	138	-	-	-	-	-	-	-	-	-	-	-
Change in NWC													
FCF	(17,932)	(13,108)	(4,146)	13,243	36,822	71,649	122,386	200,300	240,626	257,462	259,907	272,717	270,246
PV of FCF	(21,967)	(13,108)	(3,384)	8,825	20,031	31,818	44,366	59,274	58,129	50,772	41,840	35,839	28,991
Discount Rate	22.5%												
Long Term Growth Rate	1%												
Terminal Cash Flow	1,269,530												
Terminal Value YE2030	136,190												
NPV	499,582												
NPV-Debt													
Shares out ('000)	33,417	2030E											
NPV Per Share	15												

Source: Dawson James estimates

Exhibit 17. Discounted EPS Model

Current Year	2019
Year of EPS	2030
Earnings Multiple	15
Discount Factor	22.5%
Selected Year EPS	8.13
NPV	13.09

Source: Dawson James estimates

	Discount Rate and Earnings Multiple Varies, Year is Constant					
		5%	10%	15%	20%	25%	30%
Earnings Multiple	0	0.00	0.00	0.00	0.00	0.00	0.00
	5	23.78	14.25	8.74	5.47	3.49	2.27
	10	47.55	28.51	17.48	10.95	6.99	4.54
	15	71.33	42.76	26.22	16.42	10.48	6.81
	20	95.11	57.01	34.96	21.89	13.97	9.08
	25	118.89	71.27	43.71	27.37	17.47	11.35
	30	142.66	85.52	52.45	32.84	20.96	13.62
	35	166.44	99.78	61.19	38.31	24.45	15.88

Source: Dawson James estimates

Exhibit 18. Sum of the Parts Model

CytoSorbents	LT Gr	Discount Rate	Yrs to Mkt	% Success	Peak Sales (MM's)	Term Val
CytoSorb - Sepsis Direct Sales(EU)	1%	22.5%	0	70%	$151	$701
NPV						$7
CytoSorb - Sepsis Distributor (EU)	1%	22.5%	0	70%	$88	$408
NPV						$4
CytoSorb (Cardiac surgery US)	1%	22.5%	2	50%	$68	$318
NPV						$1.43
CytoSorb (Cardiac surgery EU)	1%	22.5%	0	70%	$17	$79
NPV						$0.7
CytoSorb (Sepsis US)	1%	22.5%	4	50%	$271	$1,262
NPV						$3.8
Net Margin						45%
MM Shrs OS (2030E)						33
Total						$16

Source: Dawson James estimates

Risk Analysis

Market Share Risk: CytoSorbents' potential inability to further grow product sales in the EU will hinder its profitability as more capital is invested in clinical trials to bring CytoSorb to the U.S. market. The company's product represents a new treatment for critical care patients that may take longer for adoption than predicted.

Regulatory Risk: There may be certain regulatory risks related to CytoSorb approval in the U.S.

Commercial Risk: There is no guarantee that the company will be able to develop and expand sales operations to offset research and development costs. Delays in U.S. commercialization will be negatively reflected in its valuation.

Financial Risk: The company should be expected to raise capital in the near term. We assume a raise and dilution, but there is no guarantee that market conditions will be favorable.

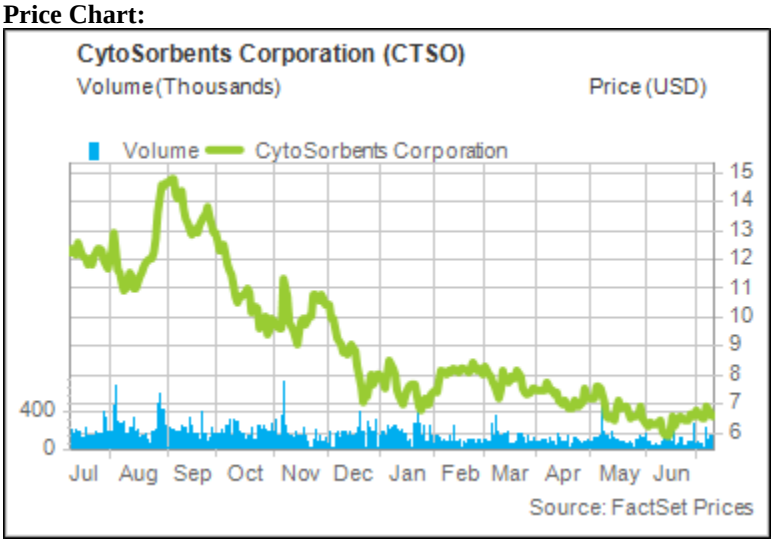
Exhibit 19. Income Statement

CTSO.: Income Statement ($000)																					
.: YE December 31	2018A	1Q19A	2Q19E	3Q19E	4Q19E	2019E	1Q20E	2Q20E	3Q20E	4Q20E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Revenue:																					
CytoSorb Direct Sales (Germany, Austria, Switzerland)	20,143	4,576	5,316	5,759	5,980	22,148	6,081	6,345	6,874	7,138	26,439	40,239	54,439	69,046	84,070	99,520	115,405	131,735	148,520	150,699	150,699
CytoSorb Distributor (Rest of EU)			1,877	2,033	2,111	7,819	3,032	3,164	3,428	3,559	13,183	13,336	21,587	27,297	41,422	55,871	70,651	85,766	86,763	87,771	87,771
CytoSorb (Cardiac surgery EU)			544	590	612	2,268	1,045	1,091	1,182	1,227	4,545	6,866	9,218	11,604	14,022	16,474	16,589	16,705	16,822	16,940	16,940
CytoSorb (Cardiac surgery US)							-	-	-	-	-	5,345	10,776	16,294	21,899	27,593	66,755	67,290	67,829	68,373	68,373
CytoSorb (sepsis US)												8,773	17,846	45,376	92,302	187,755	200,508	223,353	246,919	271,225	271,225
VetResQ						300	81	84	91	95	350	368	386	405	425	447					
Other Sales	109																				
Total Product Sales	20,252	4,576	7,736	8,381	8,704	29,397	10,239	10,684	11,574	12,020	44,517	74,927	114,251	170,022	254,140	387,660	469,908	524,849	566,853	595,008	595,008
Royalty (HemoDefend US)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant revenue	2,252	615				615					-	-	-	-	-	-	-	-	-	-	-
Other revenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Revenue	22,504	5,191	7,736	8,381	8,704	30,012	10,239	10,684	11,574	12,020	44,517	74,927	114,251	170,022	254,140	387,660	469,908	524,849	566,853	595,008	595,008
Expenses:																					
Costs of Goods Sold	7,489	1,738	2,321	2,095	2,176	8,330	2,048	2,137	2,315	2,404	8,903	14,985	22,850	34,004	50,828	77,532	93,982	104,970	113,371	119,002	119,002
%COGS	37%	38%	30%	25%	25%	25%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Research and Development	7,723	2,418	2,523	2,733	2,839	10,513	2,660	2,775	3,007	3,122	11,564	12,721	13,993	15,392	16,931	18,624	20,487	22,536	24,789	27,268	29,995
%R&D	38%	53%	33%	33%	33%	36%	26%	26%	26%	26%	26%	17%	12%	9%	7%	5%	4%	4%	4%	5%	5%
Selling, General and Administrative	20,874	4,758	5,511	5,970	6,200	22,438	5,935	6,193	6,709	6,967	25,804	29,675	32,642	33,295	33,961	34,640	35,333	36,039	36,760	37,495	38,245
%SG&A	103%	104%	71%	71%	71%	76%	58%	58%	58%	58%	58%	40%	29%	20%	13%	9%	8%	7%	6%	6%	6%
Legal, financial and other counseling	2,002	561	480	521	541	2,103	484	505	547	568	2,103	2,103	2,103	2,103	2,103	2,103	2,103	2,103	2,103	2,103	2,103
Total Expenses	38,088	9,475	10,835	11,319	11,755	43,384	11,126	11,610	12,577	13,061	48,374	59,483	71,588	84,794	103,823	132,899	151,904	165,648	177,023	185,868	189,344
Operating Income (Loss)	(15,584)	(4,284)	(3,099)	(2,938)	(3,051)	(13,372)	(887)	(926)	(1,003)	(1,041)	(3,857)	15,444	42,664	85,228	150,317	254,761	318,004	359,202	389,831	409,140	405,663
Interest income (expense), net	(1,461)	(205)																			
Gain (loss) on foreign currency transactions	(785)	(393)																			
Change in warrant liability																					
Other income (expense), net																					
Total Other Income	**(2,246)**	**(598)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pretax Income	(17,830)	(4,882)	(3,099)	(2,938)	(3,051)	(13,372)	(887)	(926)	(1,003)	(1,041)	(3,857)	15,444	42,664	85,228	150,317	254,761	318,004	359,202	389,831	409,140	405,663
Income Tax Benefit (Provision)	-	-	(155)	(147)	(153)	(669)	(71)	(74)	(80)	(83)	(309)	1,544	5,120	12,784	27,057	53,500	76,321	100,576	128,644	135,016	133,869
Tax Rate	0%	0%	5%	5%	5%	5%	8%	8%	8%	8%	8%	10%	12%	15%	18%	21%	24%	28%	33%	33%	33%
GAAP Net Income (Loss)	(17,830)	(4,882)	(2,944)	(2,791)	(2,898)	(12,703)	(816)	(852)	(923)	(958)	(3,549)	13,899	37,544	72,444	123,260	201,261	241,683	258,625	261,186	274,124	271,794
GAAP-EPS	(0.58)	(0.15)	(0.09)	(0.09)	(0.09)	(0.40)	(0.03)	(0.03)	(0.03)	(0.03)	(0.11)	0.43	1.16	2.23	3.78	6.14	7.35	7.83	7.88	8.24	8.13
GAAP-EPS (Dil)	(0.58)	(0.15)	(0.09)	(0.09)	(0.09)	(0.40)	(0.03)	(0.03)	(0.03)	(0.03)	(0.11)	0.43	1.16	2.23	3.78	6.14	7.35	7.83	7.88	8.24	8.13
Wgtd Avg Shrs (Bas) - '000s	30,719	31,931	31,963	31,995	32,027	31,979	32,059	32,091	32,123	32,155	32,107	32,236	32,365	32,494	32,625	32,755	32,887	33,018	33,151	33,283	33,417
Wgtd Avg Shrs (Dil) - '000s	30,719	31,931	31,963	31,995	32,027	31,979	32,059	32,091	32,123	32,155	32,107	32,236	32,365	32,494	32,625	32,755	32,887	33,018	33,151	33,283	33,417

Source: Dawson James estimates

Important Disclosures:

Price Chart:



Price target and rating changes over the past three years:
Initiated – Buy – July 11, 2019 – Price Target $15.00

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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 Totals
Market Outperform (Buy)	40	85%	12	30%
Market Perform (Neutral)	7	15%	0	0%
Market Underperform (Sell)	0	0%	0	0%
Total	47	100%	12	26%

Analyst Certification:

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