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CytoSorbents Corporation (NASDAQ/CTSO)

March 9, 2020

BUY: CytoSorb Drives a Strong Quarter – This is Just the Beginning

The company reported Q4 Revenues of \$7.4M, \$6.6M in cartridges vs. \$5.7M in the prior qtr. Slow but steady growth, however we see the potential for revenues to rise with new indications. In fact, we believe CytoSorb sales have just scratched the surface of what's possible. We are raising our price target from \$15.00 to \$17.00 per share.

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The Year in Review (from the company's press release);

- Exceeded 80,000 cumulative CytoSorb treatments delivered, up from 56,000 in 2018
- Modified partnership with Fresenius Medical Care to now include Mexico, Korea, France, the Czech Republic, and Finland & added 5 new direct sales countries including Poland, the Netherlands, Denmark, Norway and Sweden
- Strengthened our commercial capabilities and more than doubled the number of customer-facing sales reps and specialists in Germany, with a 50% expansion of our workforce
- Expanded CytoSorb distribution in Latin and South America, including Brazil, Colombia, and Costa Rica
- Renewed CytoSorb CE Mark through May 2024 and annual ISO 13485:2016 certification through September 2022
- Approximately 25 published papers, and additional studies highlighting the clinical benefit and utility of CytoSorb therapy in a number of observational studies
 - Significant reduction in bleeding complications in cardiac surgery patients on ticagrelor, resulting in projected cost savings of \$5,000 per patient
 - Improvements in hemodynamic stability during cardiac surgery
 - Reversal of septic shock when CytoSorb is started early
 - Improvements in microcirculation in septic shock
 - Decreased observed versus expected 28-day mortality in septic shock patients on continuous renal replacement therapy
 - Doubling of actual survival versus predicted survival in refractory cardiac arrest patients when CytoSorb was used with extracorporeal cardiopulmonary resuscitation (eCPR)
 - Third interim report of the International CytoSorb Registry confirming a marked reduction in IL-6 in critically-ill patients with treatment
- CytoSorb was included in the treatment guidelines on salvage treatment of relapsed and refractory hemophagocytic lymphohistiocytosis (HLH), where infection often triggers a massive cytokine storm, similar to cytokine release syndrome (CRS) in CAR T-cell immunotherapy
- Commencement of the first trial using CytoSorb to treat cytokine release syndrome (CRS) in CAR T-cell patients
- Award of a \$3 million, 2-year contract from the U.S. Air Force Rapid Innovation Fund (RIF) to advance development of the K+ontrol™ system to treat severe hyperkalemia
- Initiated the company-sponsored TISORB trial in the United Kingdom to further support use of CytoSorb to remove ticagrelor during cardiac surgery

China and the Corona Virus: Cytosorbents and China Medical System Holdings Limited (CMS-HKG:0867, not rated), an established specialty pharma company with a focus on sales and marketing in China and Asia, entered into an agreement to bring CytoSorb to mainland China to treat critically-ill patients with COVID-19 (2019-nCoV). In our opinion, this could jumpstart CytoSorb's presence in China and Asia.

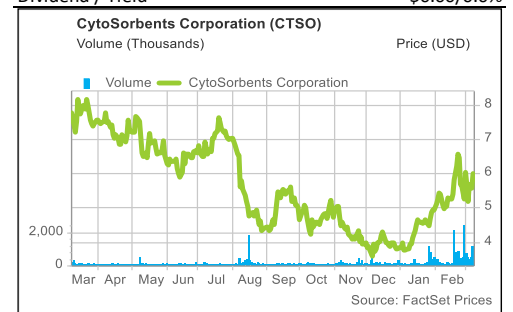
Current Price \$6.01
Price Target \$17.00

Estimates	F2019E	F2020E	F2021E
Expenses (\$000s)	\$ 43,924	\$ 47,921	\$ 61,140
1Q March	\$ 9,475	\$ 11,022	\$ 14,062
2Q June	\$ 9,862	\$ 11,501	\$ 14,674
3Q September	\$ 11,723	\$ 12,459	\$ 15,896
4Q December	\$ 12,864	\$ 12,939	\$ 16,508

	F2019E	F2020E	F2021E
EPS (diluted)	\$ (0.62)	\$ (0.39)	\$ 0.37
1Q March	\$ (0.15)	\$ (0.09)	\$ 0.09
2Q June	\$ (0.11)	\$ (0.09)	\$ 0.09
3Q September	\$ (0.21)	\$ (0.10)	\$ 0.10
4Q December	\$ (0.14)	\$ (0.10)	\$ 0.10

EBITDA/Share	(\$0.63)	(\$0.42)	\$0.42
EV/EBITDA (x)	0.0	0.0	0.0

Stock Data	
52-Week Range	\$3.49 - \$8.34
Shares Outstanding (mil.)	35.1
Market Capitalization (mil.)	\$211
Enterprise Value (mil.)	\$191
Debt to Capital	0%
Book Value/Share	\$0.35
Price/Book	36.7
Average Three Months Trading Volume (K)	458
Insider Ownership	5.8%
Institutional Ownership	27.8%
Short interest (mil.)	7.7%
Dividend / Yield	\$0.00/0.0%



ARDS and the Cytokine Storm Can kill you. As we wrote in our Feb. 11th note for Athersys (ATHX-Buy Rated), Acute Respiratory Distress Syndrome, or ARDS, occurs when fluid builds up in the tiny, elastic air sacs (alveoli) in your lungs. Severe pneumonia and the new Coronavirus too can result in an infection in the lobes of the lungs, triggering an inflammatory cascade that causes death. CytoSorb can mechanically assist in slowing down the storm (vs. Athersys Multistem which uses cell therapy to slow down – normalize immune system modulation). The two together could curb the mortality rate associated with this virus and what’s very positive for both companies is that the therapy is agnostic of the cause, i.e., It’s not viral-specific, so it should work on all patients (flu and or Coronavirus).

Adapted from the company’s February press release: *“The clinical features of the COVID-19 coronavirus and its causal relationship to the “cytokine storm” create a potential role for CytoSorb in treating patients suffering from severe coronavirus infection. “CytoSorb, the Wuhan Coronavirus, and Cytokine Storm.” This was highlighted in a recent publication in Lancet Respiratory Medicine by Drs. Claudio Ronco, Paolo Navalesi, and Jean Louis Vincent entitled, “Coronavirus epidemic: preparing for extracorporeal organ support in intensive care.” Notably, the authors state, “A sepsis-like syndrome might occur frequently due to the virus itself or to a superimposed bacterial infection and in this case, since pharmacological approaches have shown poor results, new extracorporeal organ support therapies including haemoadsorption and haemoperfusion, with new sorbent cartridges designed to remove cytokines and other circulating mediators, should be considered.” These publications provide the rationale to potentially use CytoSorb, the first specifically-approved extracorporeal cytokine adsorber in the European Union, in this setting. CytoSorb is distributed in 58 countries worldwide, and is available in Hong Kong, Vietnam, Malaysia, Germany, United Kingdom, Italy France, Spain, Belgium, United Arab Emirates, India, Russia, Finland, Sri Lanka, and Australia where patients infected with the virus have been reported”.*

We have not factored in China to our model, so any sales to China represent upside. We can recall other products and companies such as Sciclone (private), which has an immune modulator product that was utilized during the SARS outbreak in China and became a significant product afterward. **CytoSorb could build an important foothold in China as awareness grows of the technology and its ease of use and its ability to treat any virus related severe complication independent of the specific pathogen.**

Multiple Catalysts Ahead:

- The “**Remove Endocarditis**” trial in Germany. The trial has now enrolled 250 patients (and plans to add another 15 to account for any drop-outs). We should see data this year.
- Advancement of the **U.S. pivotal REFRESH 2-AKI** trial. An interim analysis is planned at N=200, estimated to occur by 1H20.
- **UK TISORB study** (company-sponsored) is evaluating the use of CytoSorb to remove anti-platelet drugs (ticagrelor) in emergency cardiac surgery patients. We note this is a global \$20B market.
- **HemoDefend IDE.** We need to check on the status suffice to say we believe a 2020 approval is possible as this is expected to be a DeNovo 510-K (two-site, n=20 person trial), to support the filing.
- **HemoDefend background.** Recall that there has been 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.

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 2022 upon commercialization. To these revenues, we apply a 70% probability of success (or 30% risk cut).

Exhibit 1. CytoSorb sepsis EU direct sales (Germany, Austria, and Switzerland)

CytoSorb - Direct Sales (Germany, Austria, Switzerland)	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
EU population	506,327,109	507,441,029	508,557,399	509,676,225	510,797,513	511,921,267	513,047,494	514,176,199	515,307,386	516,441,062	517,577,233	518,715,903	519,857,078
Germany population	81,202,563	81,632,936	82,065,591	82,500,539	82,937,791	83,377,362	83,819,262	84,263,504	84,710,100	85,159,064	85,610,407	86,064,142	86,520,282
Austria population	8,446,189	8,448,723	8,451,257	8,453,793	8,456,329	8,458,866	8,461,404	8,463,942	8,466,481	8,469,021	8,471,562	8,474,103	8,476,646
Switzerland population	8,098,152	8,115,158	8,132,200	8,149,277	8,166,391	8,183,540	8,200,726	8,217,947	8,235,205	8,252,499	8,269,829	8,287,196	8,304,599
Critical care population (Sepsis included)	498,509	500,804	503,110	505,428	507,759	510,101	512,455	514,822	517,200	519,591	521,994	524,410	526,838
Percent of patients with access to hospitals with CytoSorb	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Total patients	249,254.60	250,401.88	251,555.07	252,714.20	253,879.30	255,050.41	256,227.55	257,410.75	258,600.06	259,795.49	260,997.08	262,204.88	263,418.89
Market penetration	1.2%	1.7%	2.0%	2.0%	3.0%	4.0%	5.0%	5.0%	6.0%	6.5%	7.0%	7.5%	8.0%
Total addressable patients	2,991	4,257	4,528	5,054	7,616	10,202	12,811	14,158	15,516	16,887	18,270	19,665	21,074
Estimated units per patient	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5
Total filler needed	14,955	21,284	22,640	25,271	38,082	51,010	64,057	70,788	77,580	84,334	91,349	98,327	105,368
Cost of therapy	\$ 1,030	\$ 1,041	\$ 1,051	\$ 1,062	\$ 1,072	\$ 1,083	\$ 1,094	\$ 1,105	\$ 1,116	\$ 1,127	\$ 1,138	\$ 1,149	\$ 1,161
Change in price	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue ('000)	\$ 15,408	\$ 22,148	\$ 23,795	\$ 26,826	\$ 40,829	\$ 55,237	\$ 70,058	\$ 78,194	\$ 86,554	\$ 95,142	\$ 103,964	\$ 113,024	\$ 122,328
Risk factor													
Total revenue ('000)	\$ 15,408	\$ 22,148	\$ 23,795	\$ 26,826	\$ 40,829	\$ 55,237	\$ 70,058	\$ 78,194	\$ 86,554	\$ 95,142	\$ 103,964	\$ 113,024	\$ 122,328

Source: Dawson James estimates

Exhibit 2. CytoSorb sepsis EU sales by distributorship (excluding Germany, Austria, and Switzerland)

CytoSorb - Direct Sales (Germany, Austria, Switzerland)	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
EU population	506,327,109	507,441,029	508,557,399	509,676,225	510,797,513	511,921,267	513,047,494	514,176,199	515,307,386	516,441,062	517,577,233	518,715,903	519,857,078
Germany population	81,202,563	81,632,936	82,065,591	82,500,539	82,937,791	83,377,362	83,819,262	84,263,504	84,710,100	85,159,064	85,610,407	86,064,142	86,520,282
Austria population	8,446,189	8,448,723	8,451,257	8,453,793	8,456,329	8,458,866	8,461,404	8,463,942	8,466,481	8,469,021	8,471,562	8,474,103	8,476,646
Switzerland population	8,098,152	8,115,158	8,132,200	8,149,277	8,166,391	8,183,540	8,200,726	8,217,947	8,235,205	8,252,499	8,269,829	8,287,196	8,304,599
Critical care population (Sepsis included)	498,509	500,804	503,110	505,428	507,759	510,101	512,455	514,822	517,200	519,591	521,994	524,410	526,838
Percent of patients with access to hospitals with CytoSorb	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Total patients	249,254.60	250,401.88	251,555.07	252,714.20	253,879.30	255,050.41	256,227.55	257,410.75	258,600.06	259,795.49	260,997.08	262,204.88	263,418.89
Market penetration	1.2%	1.7%	2.0%	2.0%	3.0%	4.0%	5.0%	5.0%	6.0%	6.5%	7.0%	7.5%	8.0%
Total addressable patients	2,991	4,257	4,528	5,054	7,616	10,202	12,811	14,158	15,516	16,887	18,270	19,665	21,074
Estimated units per patient	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5
Total filler needed	14,955	21,284	22,640	25,271	38,082	51,010	64,057	70,788	77,580	84,334	91,349	98,327	105,368
Cost of therapy	\$ 1,030	\$ 1,041	\$ 1,051	\$ 1,062	\$ 1,072	\$ 1,083	\$ 1,094	\$ 1,105	\$ 1,116	\$ 1,127	\$ 1,138	\$ 1,149	\$ 1,161
Change in price	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue ('000)	\$ 15,408	\$ 22,148	\$ 23,795	\$ 26,826	\$ 40,829	\$ 55,237	\$ 70,058	\$ 78,194	\$ 86,554	\$ 95,142	\$ 103,964	\$ 113,024	\$ 122,328
Risk factor													
Total revenue ('000)	\$ 15,408	\$ 22,148	\$ 23,795	\$ 26,826	\$ 40,829	\$ 55,237	\$ 70,058	\$ 78,194	\$ 86,554	\$ 95,142	\$ 103,964	\$ 113,024	\$ 122,328

Source: Dawson James estimates

Exhibit 3. 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	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.4%	0.5%	0.7%	1.2%	1.2%	1.2%	1.2%
Total addressable patients	-	-	-	-	-	3,073	4,109	5,152	6,202	7,259	8,327	9,396	10,465
Estimated units per patient	-	-	-	3	3	3	3	3	3	3	3	3	3
Total filler needed	-	-	-	9,218	12,328	15,456	18,618	21,780	24,942	28,104	31,266	34,428	37,590
Cost of therapy	\$ 2,500	\$ 2,513	\$ 2,525	\$ 2,538	\$ 2,550	\$ 2,563	\$ 2,576	\$ 2,589	\$ 2,602	\$ 2,615	\$ 2,628	\$ 2,641	\$ 2,654
Change in price	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue ('000)	\$ -	\$ -	\$ -	\$ 23,277	\$ 31,284	\$ 39,419	\$ 47,554	\$ 55,689	\$ 63,824	\$ 71,959	\$ 80,094	\$ 88,229	\$ 96,364
Risk factor				30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Total revenue ('000)	\$ -	\$ -	\$ -	\$ 16,294	\$ 21,899	\$ 27,593	\$ 33,298	\$ 39,594	\$ 45,890	\$ 52,186	\$ 58,482	\$ 64,778	\$ 71,074

Source: Dawson James estimates

Exhibit 4. 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	1,518,080	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	2,273	4,554	6,085	7,621	9,163	10,712	12,261	13,810	15,359	16,908	18,457
Estimated units per patient	3	3	3	3	3	3	3	3	3	3	3	3	3
Total filler needed	4,074	4,536	6,818	13,663	18,254	22,863	27,490	32,136	36,782	41,428	46,074	50,720	55,366
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	\$ 3,409	\$ 6,866	\$ 9,218	\$ 11,604	\$ 14,022	\$ 16,474	\$ 18,926	\$ 21,378	\$ 23,830	\$ 26,282	\$ 28,734
Risk factor													
Total revenue ('000)	\$ 2,037	\$ 2,268	\$ 3,409	\$ 6,866	\$ 9,218	\$ 11,604	\$ 14,022	\$ 16,474	\$ 18,926	\$ 21,378	\$ 23,830	\$ 26,282	\$ 28,734

Source: Dawson James estimates

Exhibit 5. CytoSorb U.S. sales for sepsis

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%	0.3%	0.5%	0.6%	0.8%	1.0%	1.2%	1.5%	1.8%	2.1%	2.4%	2.7%
Total addressable patients	1,003	2,019	5,084	10,239	20,420	30,601	40,782	50,963	61,144	71,325	81,506	91,687	101,868
Estimated units per patient	5	5	5	5	5	5	5	5	5	5	5	5	5
Total filler needed	5,013	10,097	25,419	51,193	101,975	152,757	203,539	254,321	305,103	355,885	406,667	457,449	508,231
Cost of therapy	\$ 2,500	\$ 2,525	\$ 2,550	\$ 2,575	\$ 2,600	\$ 2,625	\$ 2,650	\$ 2,675	\$ 2,700	\$ 2,725	\$ 2,750	\$ 2,775	\$ 2,800
Change in price	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Revenue ('000)	\$ 12,533	\$ 25,494	\$ 64,824	\$ 131,860	\$ 263,720	\$ 527,440	\$ 1,054,880	\$ 1,682,320	\$ 2,309,760	\$ 3,013,120	\$ 3,716,480	\$ 4,419,840	\$ 5,123,200
Risk factor				30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Total revenue ('000)	\$ 8,773	\$ 17,846	\$ 45,376	\$ 92,302	\$ 184,604	\$ 369,208	\$ 738,416	\$ 1,117,624	\$ 1,676,432	\$ 2,235,240	\$ 2,794,048	\$ 3,352,856	\$ 4,011,664

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 \$17.00 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 \$17.00.

Exhibit 6. FCFF Model

Average \$	17
Price Target \$	18
Year	2020

DCF Valuation Using FCF (min):

units ('000)	2018A	2019A	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
EBIT	(17,830)	(20,358)	(13,669)	9,301	32,034	83,013	147,875	252,067	315,248	356,152	386,456	405,408	401,536
Tax Rate	0%	5%	8%	10%	12%	15%	18%	21%	24%	28%	33%	33%	33%
EBIT (1-t)	(17,830)	(19,340)	(12,575)	8,371	28,190	70,561	121,257	199,133	239,589	256,429	258,926	271,623	269,029
CapEx	(493)	(698)	(768)	(845)	(929)	(1,022)	(1,124)	(1,237)	(1,361)	(1,497)	(1,646)	(1,811)	(1,992)
Depreciation	391	582	-	-	-	-	-	-	-	-	-	-	-
Change in NWC	-	-	-	-	-	-	-	-	-	-	-	-	-
FCF	(17,932)	(19,457)	(13,343)	7,526	27,261	69,539	120,133	197,896	238,228	254,933	257,279	269,812	267,037
PV of FCF	(26,910)	(23,834)	(13,343)	6,144	18,166	37,828	53,348	71,739	70,498	61,585	50,736	43,435	35,092
Discount Rate	22.5%												
Long Term Growth Rate	1%												
Terminal Cash Flow	1,254,453												
Terminal Value YE2030	164,852												
NPV	600,080												
NPV-Debt	33,858												
Shares out ('000)	2030E												
NPV Per Share	18												

Source: Dawson James estimates

Exhibit 7. Discounted EPS Model

Current Year	2020
Year of EPS	2030
Earnings Multiple	15
Discount Factor	22.5%
Selected Year EPS	7.95
NPV	15.66

Source: Dawson James estimates

Discount Rate and Earnings Multiple Varies, Year is Constant							
Earnings Multiple	15.66	5%	10%	15%	20%	25%	30%
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	24.39	15.32	9.82	6.42	4.27	2.88	
10	48.78	30.63	19.64	12.83	8.53	5.76	
15	73.17	45.95	29.46	19.25	12.80	8.65	
20	97.56	61.27	39.28	25.67	17.06	11.53	
25	121.95	76.59	49.10	32.08	21.33	14.41	
30	146.34	91.90	58.92	38.50	25.60	17.29	
35	170.73	107.22	68.74	44.91	29.86	20.17	

Source: Dawson James estimates

Exhibit 8. Sum of the Parts Model

CytoSorbents	LT Gr	Discount Rate	Yrs to Mkt	% Success	Peak Sales (MMs)	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						\$1.41
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						\$3.7
Net Margin						45%
MM Shrs OS (2030E)						34
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 9. Income Statement

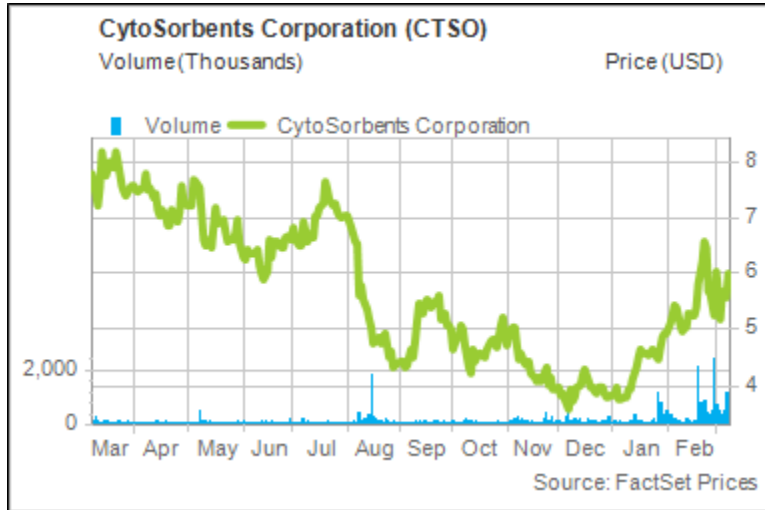
CTSO: Income Statement (\$000)																				
:YE December 31																				
	2019A	1Q20E	2Q20E	3Q20E	4Q20E	2020E	1Q21E	2Q21E	3Q21E	4Q21E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Revenue:																				
CytoSorb Direct Sales (Germany, Austria, Switzerland)	22,766	4,945	5,160	5,590	5,805	21,500	9,255	9,657	10,462	10,865	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)		2,208	2,304	2,497	2,593	9,602	3,067	3,201	3,467	3,601	13,336	21,587	27,297	41,422	55,871	70,651	85,766	86,763	87,771	87,771
CytoSorb (Cardiac surgery EU)		690	720	780	810	3,000	1,579	1,648	1,785	1,854	6,866	9,218	11,604	14,022	16,474	16,589	16,705	16,822	16,940	16,940
CytoSorb (Cardiac surgery US)		-	-	-	-	-	-	-	-	-	-	-	16,294	21,899	27,593	66,755	67,290	67,829	68,373	68,373
CytoSorb (sepsis US)		-	-	-	-	-	2,018	2,106	2,281	2,369	8,773	17,846	45,376	92,302	187,755	200,508	223,353	246,919	271,225	271,225
VetResQ		35	36	39	41	150	36	38	41	43	158	165	174	182	191					
Other Sales		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Product Sales	22,766	7,878	8,220	8,906	9,248	34,252	15,956	16,649	18,037	18,730	69,372	103,255	169,790	253,897	387,404	469,908	524,849	566,853	595,008	595,008
Royalty (HemoDefend US)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant revenue	2,184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other revenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Revenue	24,950	7,878	8,220	8,906	9,248	34,252	15,956	16,649	18,037	18,730	69,372	103,255	169,790	253,897	387,404	469,908	524,849	566,853	595,008	595,008
Expenses:																				
Costs of Goods Sold	7,364	1,576	1,644	1,781	1,850	6,850	3,191	3,330	3,607	3,746	13,874	20,651	33,958	50,779	77,481	93,982	104,970	113,371	119,002	119,002
	<i>25%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>	<i>20%</i>
Research and Development	12,092	3,059	3,192	3,458	3,591	13,301	3,365	3,512	3,804	3,950	14,631	16,094	17,704	19,474	21,422	23,564	25,920	28,512	31,364	34,500
	<i>53%</i>	<i>39%</i>	<i>39%</i>	<i>39%</i>	<i>39%</i>	<i>39%</i>	<i>21%</i>	<i>21%</i>	<i>21%</i>	<i>21%</i>	<i>21%</i>	<i>16%</i>	<i>10%</i>	<i>8%</i>	<i>5%</i>	<i>5%</i>	<i>5%</i>	<i>5%</i>	<i>5%</i>	<i>6%</i>
Selling, General and Administrative	22,006	5,821	6,074	6,580	6,833	25,307	6,694	6,985	7,567	7,858	29,103	32,013	32,653	33,307	33,973	34,652	35,345	36,052	36,773	37,509
	<i>97%</i>	<i>74%</i>	<i>74%</i>	<i>74%</i>	<i>74%</i>	<i>74%</i>	<i>42%</i>	<i>42%</i>	<i>42%</i>	<i>42%</i>	<i>42%</i>	<i>31%</i>	<i>19%</i>	<i>13%</i>	<i>9%</i>	<i>7%</i>	<i>7%</i>	<i>6%</i>	<i>6%</i>	<i>6%</i>
Legal, financial and other counseling	2,462	566	591	640	665	2,462	566	591	640	665	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462
Total Expenses	43,924	11,022	11,501	12,459	12,939	47,921	13,816	14,417	15,618	16,219	60,071	71,221	86,777	106,022	135,337	154,660	168,697	180,397	189,600	193,472
Operating Income (Loss)	(18,974)	(3,144)	(3,280)	(3,554)	(3,690)	(13,669)	2,139	2,232	2,418	2,511	9,301	32,034	83,013	147,875	252,067	315,248	356,152	386,456	405,408	401,536
Interest income (expense), net																				
Gain (loss) on foreign currency transactions	(1,384)																			
Change in warrant liability																				
Other income (expense), net																				
Total Other Income	(1,384)																			
Pretax Income	(20,358)	(3,144)	(3,280)	(3,554)	(3,690)	(13,669)	2,139	2,232	2,418	2,511	9,301	32,034	83,013	147,875	252,067	315,248	356,152	386,456	405,408	401,536
Income Tax Benefit (Provision)	1,092	(252)	(262)	(284)	(295)	(1,093)	214	223	242	251	930	3,844	12,452	26,617	52,934	75,660	99,723	127,531	133,784	132,507
Tax Rate	5%	8%	8%	8%	8%	8%	10%	10%	10%	10%	10%	12%	15%	18%	21%	24%	28%	33%	33%	33%
GAAP Net Income (Loss)	(19,266)	(2,892)	(3,018)	(3,270)	(3,395)	(12,575)	1,925	2,009	2,176	2,260	8,371	28,190	70,561	121,257	199,133	239,589	256,429	258,926	271,623	269,029
GAAP-EPS	(0.60)	(0.09)	(0.09)	(0.10)	(0.10)	(0.39)	0.06	0.06	0.07	0.07	0.26	0.86	2.14	3.67	6.00	7.19	7.67	7.71	8.05	7.95
GAAP-EPS (Dil)	(0.60)	(0.09)	(0.09)	(0.10)	(0.10)	(0.39)	0.06	0.06	0.07	0.07	0.26	0.86	2.14	3.67	6.00	7.19	7.67	7.71	8.05	7.95
Wgtd Avg Shrs (Bas) - '000s	32,253	32,482	32,515	32,547	32,580	32,531	32,613	32,645	32,678	32,711	32,662	32,792	32,924	33,056	33,188	33,321	33,454	33,589	33,723	33,858
Wgtd Avg Shrs (Dil) - '000s	32,253	32,482	32,515	32,547	32,580	32,531	32,613	32,645	32,678	32,711	32,662	32,792	32,924	33,056	33,188	33,321	33,454	33,589	33,723	33,858

Source: Dawson James estimates

Important Disclosures:

Companies mentioned in this report include:
China Medical System Holdings Limited (CMS-HKG:0867, Not Rated),
Atherys (ATHX) Buy rated

Price Chart:



Price target and rating changes over the past three years:

- Initiated – Buy – July 11, 2019 – Price Target \$15.00
- Update – Buy – August 12, 2019 – Price Target \$15.00
- Update – Buy – August 15, 2019 – Price Target \$15.00
- Update – Buy – August 19, 2019 – Price Target \$15.00
- Update – Buy – November 6, 2019 – Price Target \$15.00
- Update – Buy – February 19, 2020 – Price Target \$15.00
- Price Target Increase – Buy – March 9, 2020 – Price Target \$17.00

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- 2) **Neutral:** The analyst believes the price of the stock is fairly valued for the next 12-18 months;
- 3) **Sell:** 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.

Ratings Distribution	Company Coverage		Investment Banking	
	# of Companies	% of Total	# of Companies	% of Totals
Market Outperform (Buy)	22	85%	3	14%
Market Perform (Neutral)	4	15%	1	25%
Market Underperform (Sell)	0	0%	0	0%
Total	26	100%	4	15%

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