BioTime Inc. (NYSE/BTX)

February 7, 2019

BUY: Focus on Macular Degeneration & Spine

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Biotime (BTX) has the potential to change the treatment paradigm for the treatment of patients effected by macular degeneration and spinal paralysis Beyond these indications, there are even more opportunities. With a refocused (new) management team and the acquisition of Asterias we see a transformational opportunity ahead.

Investment Highlights

We view BioTime as a new company invigorated by a new management team and a focused vision on how to walk forward. The two leading programs, Age-related Macular Degeneration (AMD) and Spinal Cord Injury (SCI) are primed to advance. The acquisition of Asterias (AST: Not Rated) is expected to close in 1Q19 bringing the SCI program back to BioTime. These lead programs (AMD and SCI) involve the application of allogeneic cells to treat the disease and acute injury. We see the lead product and the performance driver for the company as OpRegen for Macular Degeneration, as this indication is a multi-billion-dollar market opportunity.

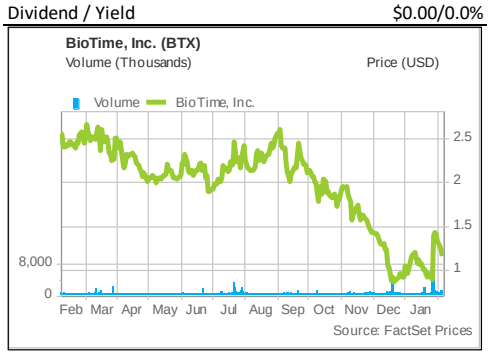
What is OpRegen? It's a suspension of retinal pigment epithelial (RPE) cells that are derived from pluripotent stem cells. RPE cells form the back lining of the retina and support the function of photoreceptors (rods and cones). RPE cells can be damaged and lost in various forms of retinal degeneration. The OpRegen approach is to replace damaged or lost RPE cells and possibly slow disease progression and/or preserve or restore visual function. It is currently in a Phase 2/2a clinical trial for the treatment of the dry form of AMD. AMD affects approximately 1.6 million newly diagnosed people annually in the U.S. and is the leading cause of blindness in people over the age of 60. Approximately 90 percent of AMD patients suffer from the dry form (dry-AMD), for which there are no FDA-approved therapies.

Does the current data suggest it works? A Phase 1/2a study is being conducted in 24 patients, across four groups with 12 in the first three groups and 12 in the last group. The early data suggests disease stabilization and engraftment of the cells. Bottom line: The early data from patients with earlier-stage dry-AMD with geographic atrophy (GA) is encouraging.

BioTime's second lead products is OPC1 for spinal cord injury. This is an oligodendrocyte progenitor cell population derived from pluripotent stem cells that is currently in a Phase 2 clinical trial for spinal cord injuries (SCI) with support from the California Institute for Regenerative Medicine (CIRM). The Phase1/2 study is in 25 patients who are set to receive up to 20M cells. Thus far the therapy has shown a good safety profile, evidence of durable cell engraftment and promising motor recovery.

Current Price	**$1.16**
Price Target	**$6.00**

Estimates	F2018A	F2019E	F2020E
Revenues ($000s)	$ 5,080	$ 5,131	$ 5,182
1Q March	$ 701	$ 1,180	$ 1,192
2Q June	$ 2,547	$ 1,231	$ 1,244
3Q September	$ 982	$ 1,283	$ 1,296
4Q December	$ 850	$ 1,437	$ 1,451
	F2018A	F2019E	F2020E
EPS (diluted)	$ 0.11	$ (0.13)	$ (0.08)
1Q March	$ (0.30)	$ (0.05)	$ (0.02)
2Q June	$ (0.04)	$ (0.03)	$ (0.02)
3Q September	$ 0.53	$ (0.03)	$ (0.02)
4Q December	$ (0.08)	$ (0.03)	$ (0.02)
EBITDA/Share	$0.00	($0.10)	($0.08)
EV/EBITDA (x)	-	1,288	1,696
Stock Data			
52-Week Range	$0.66	-	$2.90
Shares Outstanding (mil.)			127.2
Market Capitalization (mil.)			$148
Enterprise Value (mil.)			$128
Debt to Capital			0%
Book Value/Share			$1.28
Price/Book			1.7
Average Three Months Trading Volume (K)			163
Insider Ownership			1.1%
Institutional Ownership			50.7%
Short interest (mil.)			0.1
Dividend / Yield			$0.00/0.0%



Initiation - February 7, 2019 - Buy - Price Target $6.00

Renevia. A non-dilutive financing opportunity. This is a BioTime product that is now applying for a European CE mark. Renevia has been developed for facial lipoatrophy. Renevia uses a unique combination of HyStem (a patented biomaterial that acts as an extracellular matrix). HyStem hydrogel is injected with a needle where its needed. Renevia combines the matrix with adipose derived stem cells.

Valuation: Our valuation for BioTime is principally driven by the opportunity in Dry-AMD, narrowed down further by a sub-set of patients with GA. Our model does include modest revenues from the SCI product and from Renevia, but as previously stated, the majority of the valuation is driven by OpRegen. We assume just a 30% probability of success, in Dry-AMD and SCI, which drives our $6.00 target.

Exhibit 1. Milestones and catalysts for BioTime Inc.

Product	Indication	Event	Timeline	Impact
BioTime		Complete acquisition of Asterias Biotherapeutics, Inc. (NYSE: AST)	1Q19	+
BioTime		Launch new corporate identity with focus on clinical-stage cell therapy programs	1Q19	+
OpRegen	AMD	Data from P1/2a study	1Q19	+
OPC1	SCI	OPC1* Clinical Study Data (12 month results)	2019	+
Renevia	Lipo-atrpy	Provide update on Renevia program and CE Mark	1Q19	+
OpRegen	AMD	Complete patient enrollment in OpRegen Phase 1/2a clinical study	1Q19	+
OpRegen	AMD	Introduce Orbit Biomedical device into ongoing OpRegen clinical study	1Q19	+
OPC1	SCI	Regulatorty Dialouge for Next Step	2H19	+
OpRegen	AMD	Regulatorty Dialouge for Next Step	2H19	+

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

Source: BioTime and Dawson James.

Exhibit 2. BioTime proposed pipeline.

Product	Geography	Indication	Development	Pre-IND	Phase I	Phase II	Phase III	NDA
OpRegen-1		Dry Macular Degeneration						
OpRegen-2		Spinal Cord Injury						
Renevia		Facial Lipodystrophy						

Source: Dawson James.

Recent transactions & finances. BioTime for years was a complex company with many different operating divisions which translated both into a high expenditures (burn) rate and in our opinion created a lack of focus. In more recent times, and as part of an effort to unlock value and increase focus BioTime spun-out these several business units. These include Asterias, AgeX and Oncocyte. As a result, BioTime still owns significant amounts of these companies. BioTime this past summer began efforts to monetize its stake where appropriate. Interestingly enough, BioTime is now acquiring back Asterias and filed a definitive merger agreement (Jan.4, 2019). We expect the transaction to close by the end of first quarter, 2019.

- In August of 2018 BioTime entered into a Stock Purchase Agreement with Juvenescence Limited and AgeX Therapeutics, Inc., (AGE: Not Rated) pursuant to which BioTime sold 14.4 million shares of the common stock of AgeX to Juvenescence for $3.00 per share. The Purchase Agreement set a purchase price for the AgeX Shares of $43.2 million of which $10.8 million was paid upon the closing of the Juvenescence Transaction and $10.8 million was paid on November 2, 2018, with the remaining $21.6 million to be paid under the terms of an unsecured convertible promissory note. Juvenescence's obligation to pay the second installment of $10.8 million is secured by a pledge of 3.6 million AgeX Shares. We estimate BioTime going forward will own approximately 5% of AgeX.

- In addition to AgeX, BioTime also has significant equity holdings in Asterias Biotherapeutics, Inc. (Asterias AST Not Rated), where BioTime owns approximately 39% of the company, and the remainder of which is set to be acquired back by BioTime (announced Nov 7, 2018), and OncoCyte Corporation (OncoCyte OCX-Not Rated). OncoCyte is developing confirmatory diagnostic tests for lung cancer utilizing novel liquid biopsy technology. BioTime today owns approximately 36% of OncoCyte.

- Q318 reported results. BioTime spent approximately $10M in the quarter and going forward we expect that burn-rate to moderate substantially lower, closer to $6M per quarter. The company closed the period with $21M in cash and marketable equity and a $21M promissory note from Juvenescence, and an equity stake of $43M, a reported equity stake of $36.6M in AgeX, and a $28M stake in Asterias (which is set to be acquired and consolidated into BioTime). BioTime is offering 0.71shares for each share of Asterias common, 55M shares outstanding. We assume BioTime's share count will rise with the acquisition of Asterias.

OpRegen data. Last October BioTime presented positive data from the Phase 1/2a study of OpRegen in dry-AMD patients at the 2018 American Academy of Ophthalmology Annual Meeting (AAO 2018). We have paraphrased the data as follows: OpRegen is a retinal pigment epithelium cell therapy transplant. Data from the study demonstrated that treatment continues to be well tolerated and shows signs of structural improvement in the retina and decreases in drusen density in some patients. Notably, early data are encouraging from Cohort 4 patients with earlier-stage dry-AMD. The early data indicate structural improvement within the retina, evidence of the continued presence of the transplanted OpRegen cells, and improvements in visual acuity. The data was presented by Eyal Banin, MD, PhD, Professor of Ophthalmology, Director, Center for Retinal and Macular Degenerations, Department of Ophthalmology at Hadassah-Hebrew University Medical Center, the presenting author and one of the investigators participating in the study.

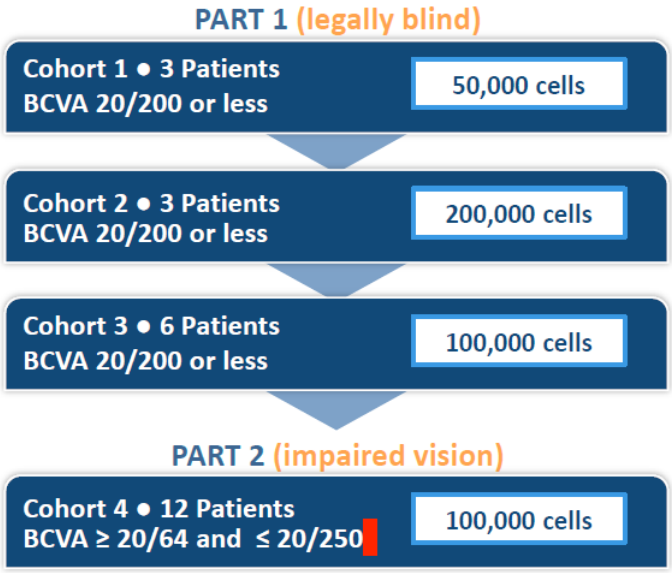
The data presented at AAO showed that both the surgical procedure and the OpRegen cells were generally well tolerated and there were no unexpected adverse events or treatment-related systemic serious adverse events reported in the first fifteen patients enrolled into this Phase 1/2a study. The most common and expected ocular adverse events were the formation of mild epiretinal membranes. One instance of retinal detachment occurred in a patient who was legally blind prior to treatment. The event was not able to be assigned as related to treatment, procedure, or to the combination and the patient continued in the study following successful surgical repair. Imaging of several Cohort 1-3 patients, and of particular interest, those from the Cohort 4 (n=3), demonstrated structural improvement within the retina and evidence of the continued presence of the transplanted OpRegen cells. Within the area of the OpRegen cell transplant, signs of a reduction and change in drusen material as well as improvements or possible restorations of the ellipsoid zone and retinal pigment epithelium (RPE) layers persisted. The photoreceptor layer and ellipsoid zone assumed a more regular structural appearance in areas of the transition zone where OpRegen was administered, suggesting potential structural restoration of the retina in areas receiving the RPE cells. This is of particular importance, because in dry-AMD the structure of the retina can be impacted by the formation of excess drusen and ultimately death of RPE cells and photoreceptors, which are critical to sight. Other changes observed following OpRegen treatment, persisted through the last time point examined (>3 years in some patients), included subretinal pigmentation and hyper-reflective areas seen on OCT.

The Best Corrected Visual Acuity (BCVA) and areas of geographic atrophy (GA) for patients have remained relatively stable thus far in both the treated and fellow eye. Notably, the visual acuity of the first 3 Cohort 4 patients have all seen improvements from baseline levels, which will need to be followed for longer periods of time. OpRegen, which is currently enrolling Cohort 4 patients with less severe disease (i.e. smaller areas of GA and better vision acuity of between 20/64 and 20/250), appears well tolerated with preliminary evidence of improved structural changes and potential improvement in visual acuity following treatment in some patients.

Exhibit 3. The effects of macular degeneration: A partial loss of vision.

Source: www.scottsdaleeye.com

Exhibit 4. The OpRegen trial design in AMD.



Purpose: To evaluate the safety and efficacy of subretinally transplanted RPE cells in patients with intermediate to advanced dry-form AMD with GA

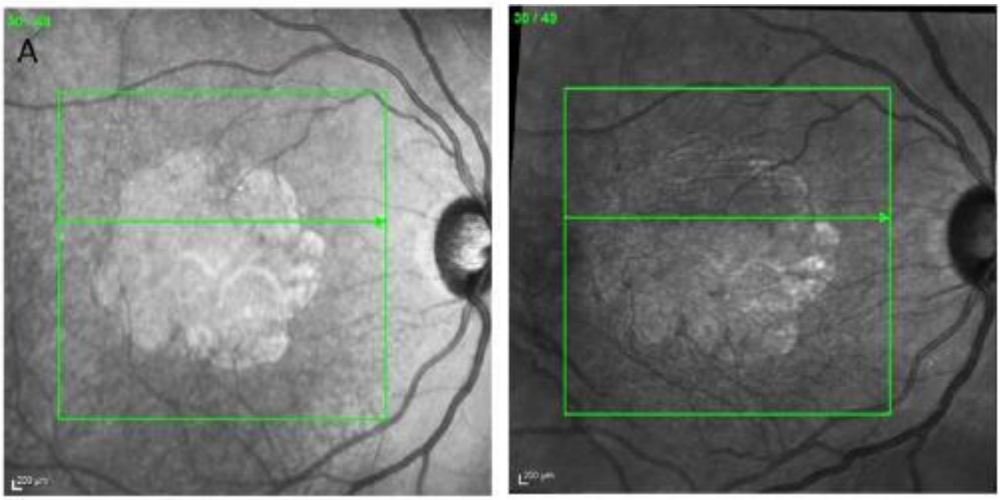
Design: Open label, non-randomized, sequential, and multi-center

Dose and Administration: Single dose of 50ul cells injected into the subretinal space

Site Locations: U.S.A. and Israel

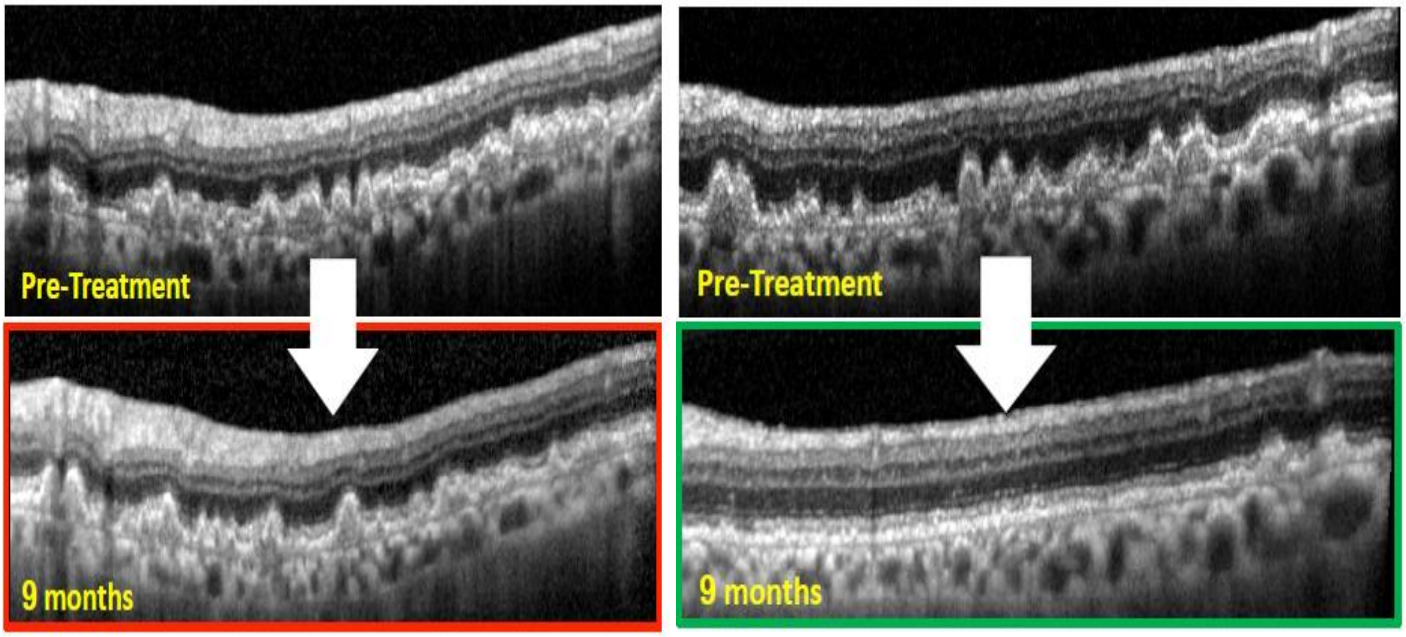
Source: BioTime.

Exhibit 5. Stable engraftment of OpRegen cells in man. Image on the left shows geographic atrophy (light area in center) and the image on the right show's potential engraftment of cells.



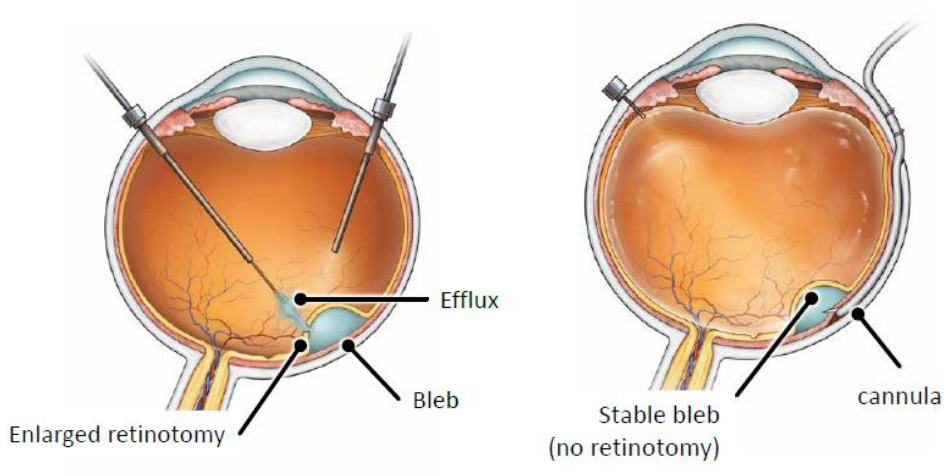
Source: BioTime.

Exhibit 6. Evidence of drusen reduction. Image on the left shows drusen build-up in peaks with no change nine months later versus the image on the right which show's a smoother line or a reduction of drusen.



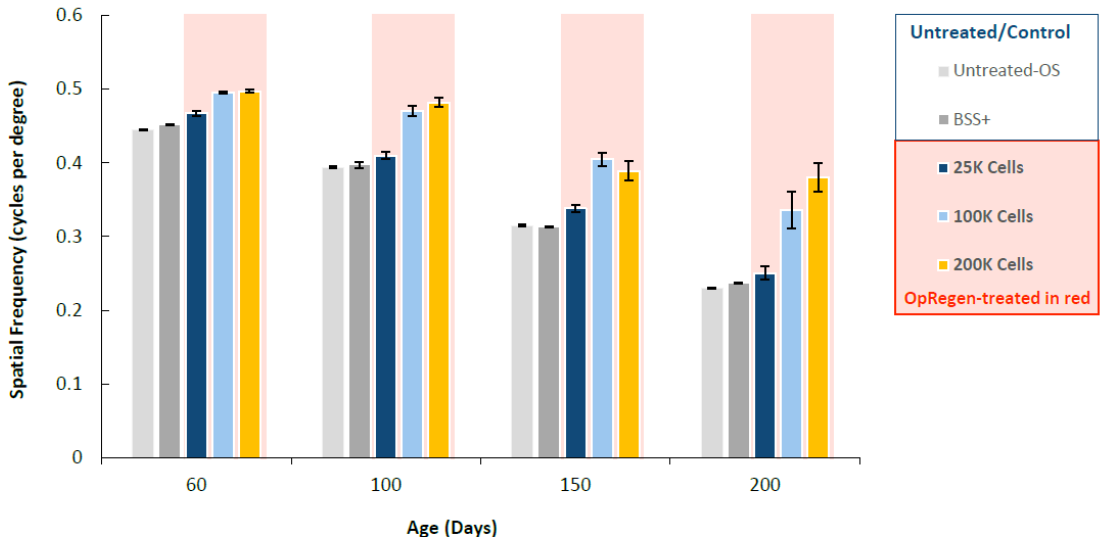
Source: BioTime.

Exhibit 7. Challenges associated with delivering a cell therapy to the RPE layer. Left image shows the traditional method which involves a vitrectomy and a retinotomy. Image on the right shows a vitrectomy-free subretinal injection using a new device (from Orbit Biomedical) which BioTime now has access to, through an exclusive partnership. The new procedure is considered to be safer, is done with a local anesthetic.



Source: BioTime and Orbit Biomedical.

Exhibit 8. The data suggests a dose-dependent rescue of vision as seen with optokinetic tracking.



Source: BioTime.

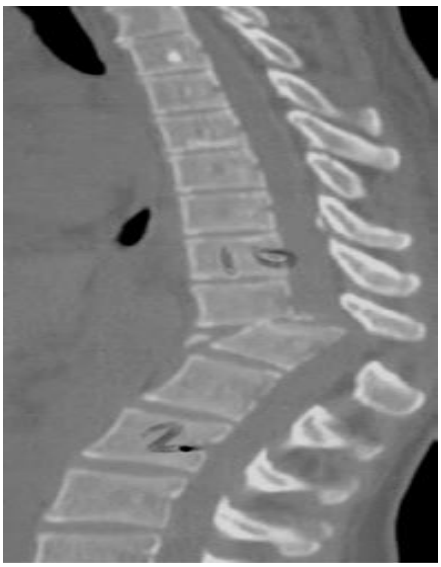
Exhibit 9. Geographic Dry-AMD market model.

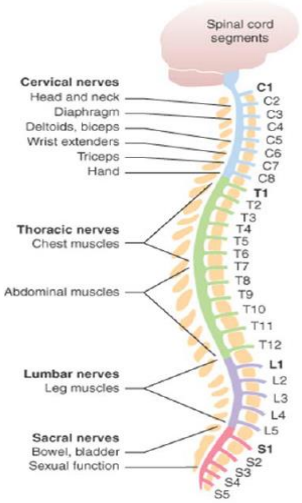
Age-Related Macular Degeneration	2016A	2017A	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E
Prevalence of AMD	30,000,000	31,600,000	33,200,000	34,800,000	36,400,000	38,000,000	39,600,000	41,200,000	42,800,000	44,400,000	46,000,000	47,600,000	49,200,000	49,200,000
Growth Rate	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000	1,600,000
25% of Patients diagnosed with specific geographic atrophy	7,500,000	7,900,000	8,300,000	8,700,000	9,100,000	9,500,000	9,900,000	10,300,000	10,700,000	11,100,000	11,500,000	11,900,000	12,300,000	12,300,000
75% Paitients eligibility, with insurance who have access	5,625,000	5,925,000	6,225,000	6,525,000	6,825,000	7,125,000	7,425,000	7,725,000	8,025,000	8,325,000	8,625,000	8,925,000	9,225,000	9,225,000
Market Share	0%	0%	0%	0%	0%	0%	0%	2%	3%	4%	5%	6%	7%	8%
Total Patients for therapy	-	-	-	-	-	-	-	154,500	240,750	333,000	431,250	535,500	645,750	738,000
cost of therapy	-	-	-	-	-	7,500	7,425	7,277	7,131	6,988	6,849	6,712	6,712	6,712
change in cost of therapy	1.00%	1.0%	1.0%	1.0%	1.0%	-1.0%	-1.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	0.0%	0.0%
number of treatments per patient	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Probability of Success	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Total Revenues (millions)	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 675**	**$ 1,030**	**$ 1,396**	**$ 1,772**	**$ 2,156**	**$ 2,600**	**$ 2,972**

Source: Dawson James.

Spinal Cord Injury. Diseases and disorders of the spinal cord: AST-OPC1 is Asteria's product in development for spinal cord injuries. It utilizes oligodendrocyte progenitor cells, which the company manufactures from its pluripotent stem cell platform. Asterias is enrolling patients in a Phase 1/2a clinical trial in subacute, cervical (neck) spinal cord injury. AST-OPC1 cells are inserted directly into the damaged section of the spinal cord through a surgical procedure. The hope is that addition of these cells, can exert a trophic effect (supporting healthy functioning of nerve cells) and as such, can improve the transmission of signals from the brain through the spinal cord and out to the upper extremities. In an ideal world patient could be able to regain some feeling, and or function in the use of their arms, hands and fingers. Regaining use of the upper extremities can dramatically reduce health care costs and have a direct impact on a patient's ability to live independently. OPC1 has RMAT (spell out?) designation from the FDA and has received greater than $14M in funding from the California Institute of Regenerative Medicine (CIRM).

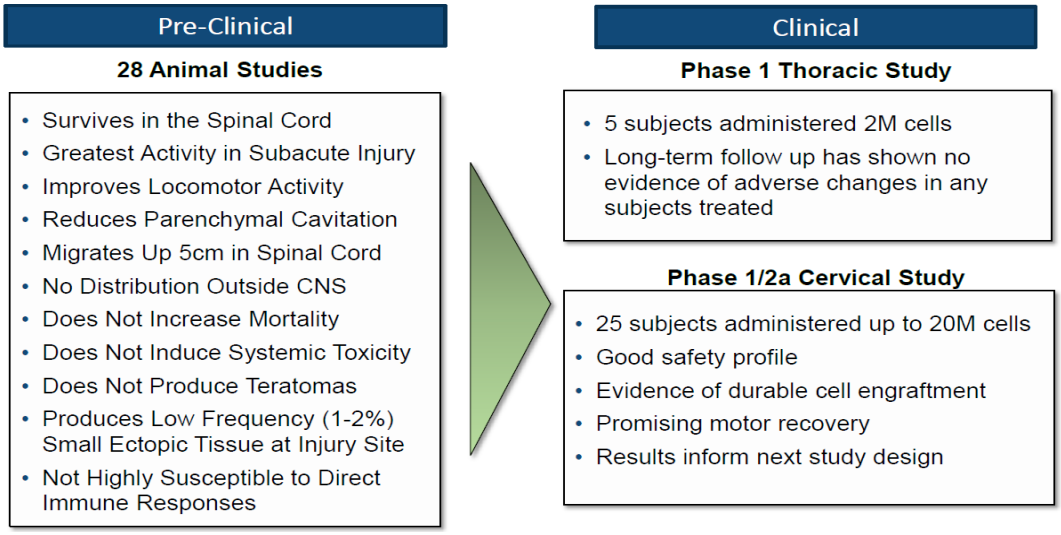
Exhibit 10. The tragedy of spinal injury. Any recovery of feeling translates into important gains in quality of life for these patients. OPC1 is now in a Phase 1/2a trial (up to N=35) in eight clinical sites. Entry criteria is AIS-A and AIS-B patients with 2m, 10m, and 20m cell cohorts. The primary assessment is safety with a secondary assessment of motor function improvement through upper extremity motor score and motor levels. Note the trial is now completely enrolled.





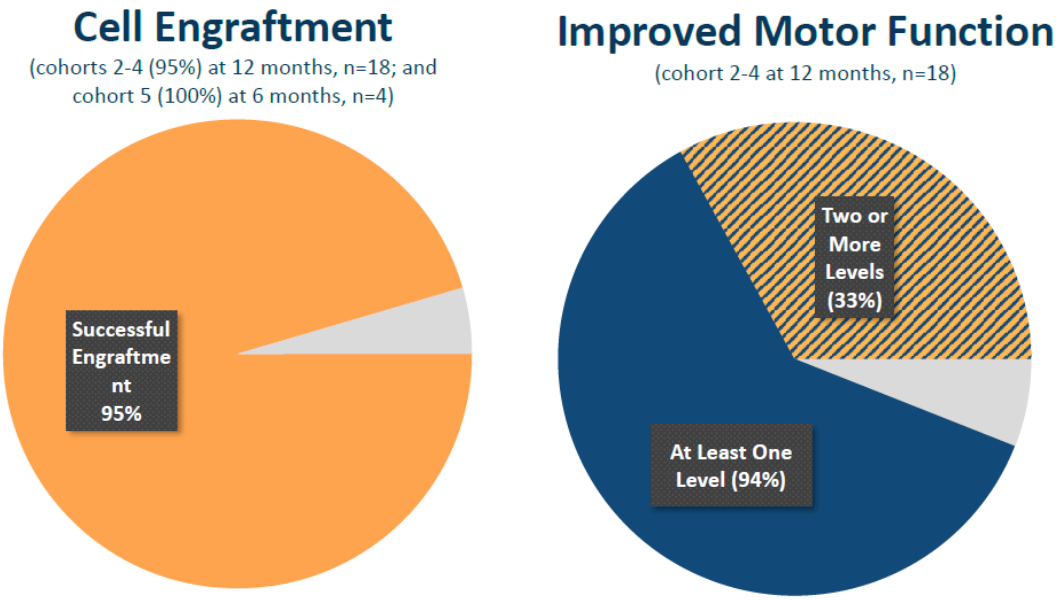
Source: BioTime (center) and Asterias (left).

Exhibit 11. OPC1 Development in Spinal Cord Injury (SCI).



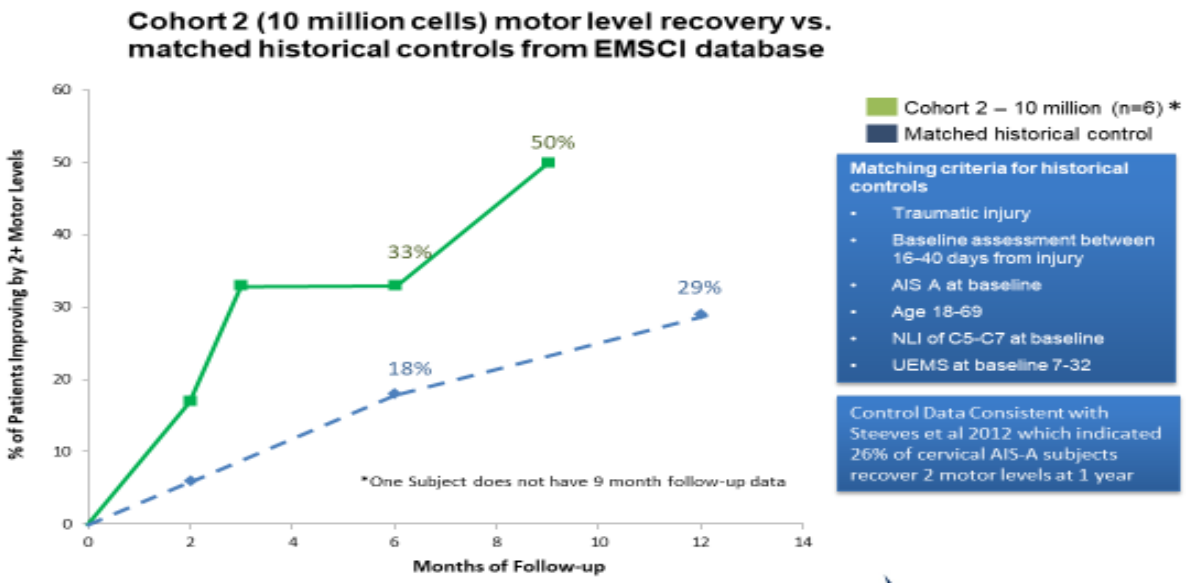
Source: BioTime.

Exhibit 12. Clinical data, (Phase 1/2a study), thus far, suggests a signal and a high degree of safety.



Source: BioTime.

Exhibit 13. Data from the second cohort, motor level recovery for six patients at nine-month follow-up period.



Source: Steeves et al., Top Spinal Cord Inj Rehabil 2012; 18(1): 1-14.

Exhibit 14. Patient stories.

- Lucas will be throwing out the first pitch at a MLB game on August 13th
- Lucas can now write with a pen, type e-mails at 40 words per minute, use his phone, and feed himself.

- Kris can now use his hands and fingers to feed himself, drink, text, send e-mails, sign his name and even play video games.

To view the video, go to https://www.youtube.com/watch?v=iZ2ycm21CwA

Source: Asterias.

Exhibit 15. OPC1 SCI market model.

Spinal Paralysis (OPC1)	2016A	2017A	2018A	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E
Acute spinal cord injury (C4-C7 ASIA A-C)	6,000	6,060	6,121	6,182	6,244	6,306	6,369	6,433	6,497	6,562	6,628	6,694	6,761	6,829
Growth Rate of incidence	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Market Sahre (%): SCI Patients	0%	0%	0%	0%	0%	0%	2%	4%	6%	10%	15%	30%	40%	40%
Target Patient Population	0	0	0	0	0	6,306	6,369	6,433	6,497	6,562	6,628	6,694	6,761	6,829
Patients who have access, insurance- 75%	0	0	0	0	0	4,730	4,777	4,825	4,873	4,922	4,971	5,021	5,071	5,121
Unit Cost of Therapy						$ 100,000	$ 100,000	$ 101,000	$ 102,010	$ 103,030	$ 104,060	$ 105,101	$ 106,152	$ 106,152
Change in Cost of Therapy	1%	1%	1%	1%	1%	0%	0%	1%	1%	1%	1%	1%	1%	1%
Treated Patients						-	96	193	292	492	746	1,506	2,028	2,049
Number of Units per Patient	1	1	1	1	1	1	1	2	2	2	2	2	2	2
Probability of Success	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Total Revenues (Millions)	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 3**	**$ 12**	**$ 18**	**$ 30**	**$ 47**	**$ 95**	**$ 129**	**$ 130**

Source: Dawson James.

Renevia is a facial aesthetics product. It has been developed as a potential treatment for facial lipoatrophy. Lipoatrophy in this case means the loss of fat tissue which may be caused by several factors, including trauma, aging or drug side effects such as those that cause HIV-associated lipoatrophy. Renevia is a proprietary cell and drug delivery matrix which is combined with the patient's own fat or adipose progenitor cells. As a potential alternative to traditional fat transfer procedures, Renevia is designed to mimic the naturally-occurring extracellular matrix in the body and provide a 3-D scaffold that supports effective cell transplant, retention, engraftment, and metabolic support. Renevia is being developed with the goal of providing a natural looking and feeling, long-lasting option for facial volume restoration.

In 2017 Renevia met the primary endpoint of implanted volume retention in a pivotal clinical trial in Europe to assess its safety and efficacy in restoring facial volume in patients whose subcutaneous fat, or adipose tissue has been lost due to a side effect of certain drugs used to treat some patients with HIV. Based on these clinical trial results, on March 13, 2018, BioTime filed for marketing authorization in the European Union for certain forms of facial lipoatrophy. Approval is expected by the end of 1Q19.

Exhibit 16. Renevia market model. We expect BioTime to out-license this product.

Renevia (EU) Estimates	2016A	2017A	2018A	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E
HIV Prevalance	2,000,000	1,980,000	1,960,200	1,940,598	1,921,192	1,901,980	1,882,960	1,864,131	1,845,489	1,827,034	1,808,764	1,790,677	1,772,770	1,755,042
Growth Rate of incidence	1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Patients in HEART or Other Rgimens	1,500,000	1,485,000	1,470,150	1,455,449	1,440,894	1,426,485	1,412,220	1,398,098	1,384,117	1,370,276	1,356,573	1,343,007	1,329,577	1,316,282
Patients with HIV associated Lipid Dystrophy	150,000	148,500	147,015	145,545	144,089	142,649	141,222	139,810	138,412	137,028	135,657	134,301	132,958	131,628
Market Share (%)	0%	0%	0%	0%	2%	3%	5%	10%	12%	14%	15%	15%	15%	15%
Target Patient Population	0	0	0	0	2,882	4,279	7,061	13,981	16,609	19,184	20,349	20,145	19,944	19,744
Patients who have access, viable & insurance- 75%	0	0	0	0	1,441	3,210	5,296	10,486	12,457	14,388	15,261	15,109	14,958	14,808
Unit Cost of Therapy						$ 7,500	$ 7,575	$ 7,651	$ 7,727	$ 7,805	$ 7,883	$ 7,961	$ 8,041	$ 8,041
Change in Cost of Therapy	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Treated Patients						96	265	1,049	1,495	2,014	2,289	2,266	2,244	2,221
Number of Units per Patient	1	1	1	1	1	1	1	2	2	2	2	2	2	2
Probability of Success	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
Total Revenues (Millions)	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1**	**$ 2**	**$ 12**	**$ 17**	**$ 24**	**$ 27**	**$ 27**	**$ 27**	**$ 27**

Source: Dawson James.

Exhibit 17. Ownership of affiliated public companies. BioTime has ownership stakes in addition to Asterias (where BioTime owns 39% of the company and plans to acquire what remains); OncoCyte Corporation (BioTime owns approximately 36%), which is developing confirmatory diagnostic tests for lung cancer utilizing novel liquid biopsy technology and lastly AgeX, where BioTime owns 40% of the company. AgeX is applying technology relating to cellular immortality and regenerative biology to aging and age-related diseases.

Affiliated Asset	As of: Q3 2018	By the end of: Q1 2019
ASTERIAS BIOTHERAPEUTICS	39%-owned	100%-owned*
AGEX THERAPEUTICS	40%-owned	~5%-owned**
OncoCyte™	36%-owned	No change

Source: BioTime.

Modeling Assumptions:

1. OpRegen: We assume a 30% probability of success for OpRegen in Dry-Age related Macular degeneration. We model the market as targeting patients with geographic atrophy (25% of the dry-AMD market). Additionally, we assume 75% of the market has access (insurance and represent other-wise viable candidates). We assume two doses of therapy (each eye) with a price of just $7,500 per unit. We assume the product based on an abbreviated Phase 2/3 study could reach the market by 2023. Our model is U.S. based. The opportunity in Europe is equal to, or greater than, the U.S. opportunity. Europe is excluded for conservatism.
2. OPC1: We assume a 30% probability of success for OPC1in Spinal Cord Injury (SCI) and a $100k price. While the SCI market is estimated in the U.S. to be close to 15,000 injuries a year, we narrow the market to C4-C7 injuries, ASIA-A through C, for 6,000 annually. We assume the product based on an abbreviated Phase 2/3 study could reach the market by 2023. We assign a 30% probability of success to our therapeutic model for OPC1 in spinal cord injury in the U.S.
3. Renevia: We include Renevia in our model. However we note that it is likely this product is divested. One way to consider its value is as a non-dilutive financing. For valuation purposes, our analysis of the market assumes 150,000 target patients, a price of $7,500 per unit. With modest market penetration (15%) this could be $25M annual product in Europe.
4. We have not included any other product values in our model for BioTime. This includes VAC2 currently in development by Asterias for non-small cell lung cancer. VAC2 is an allogenic dendritic cell designed to stimulate an immune response to an antigen present in 85% plus of cancers. We assume BioTime upon closing of the merger will divest this program (versus keeping it and investing limited resources).
5. We do not place any value in our model on AgeX, and Oncocyte minority-owned positions.

Valuation. It is difficult to predict probabilities of success from phase 1/2a data. As such, we use a low probability of success for OpRegen and OPC1 of just 30%. We model OPGEN in dry macular degeneration with geographic atrophy, as well as OPC1 in SCI, although the real driver is dry-AMD as a result of the large market size. We do not model any revenues from these programs until 2022. Our models also factor in funding (dilution) using a 2029 share count of 280M shares versus the last reported share count of 126M.

We triangulate FCFF, discounted EPS, and sum-of-the-parts models and select a 30% discount rate across these three models. The 30% discount is based on the early nature of the company's products. For companies with high visibility and positive cash flow we typically use a discount rate of 10%, for companies with products generating revenues, approaching cash flow break even or better, we typically use a 15% discount rate. We then average and equally weight each model, rounded to the nearest whole number, to derive a net present value, which is where we set our target price. Investors should recognize that this modeling exercise, which is projected ten years forward is based on the current (limited) data and estimates. As such our ability to predict a 12-month target is strained. The price of the stock is likely to be driven in the near term by factors such as news flow, early trial data, and cyclic concerns of financings (dilution). One possible catalyst may be the approval of Renevia in Europe which could lead to an out-license deal that could bring in additional capital to the company. We also see value in the ownership stakes of Oncocyte and AgeX, but we exclude this from our valuation metrics. For modeling purposes, we assume Asterias and BioTime are one company.

Exhibit 18. Free Cash Flow Model.

Average	6.0
Price Target	5.8
Year	2019

DCF Valuation Using FCF (mln):

units ('000)	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E
EBIT	84,398	(26,551)	(20,163)	(30,702)	(55,684)	427,718	709,311	1,006,516	1,412,368	2,263,992	2,238,938	2,554,614
Tax Rate	0%	0%	0%	0%	0%	0%	0%	10%	15%	20%	25%	28%
EBIT (1-t)	84,398	(26,551)	(20,163)	(30,702)	(55,684)	427,718	709,311	905,864	1,200,513	1,811,194	1,679,203	1,839,322
CapEx	(9,704)	-	-	-	-	-	-	-	-	-	-	-
Depreciation	(762)	-	-	-	-	-	-	-	-	-	-	-
Change in NWC												
FCF	73,932	(26,551)	(20,163)	(30,702)	(55,684)	427,718	709,311	905,864	1,200,513	1,811,194	1,679,203	1,839,322
PV of FCF	73,932	(26,551)	(15,510)	(18,167)	(25,346)	149,756	191,038	187,673	191,321	222,033	158,348	133,421
Discount Rate	30%											
Long Term Growth Rate	1%											
Terminal Cash Flow	6,405,914											
Terminal Value YE2027	464,673											
NPV	1,639,242											
NPV-Debt	-											
Shares out ('000)	280,278	2029E										
NPV Per Share	5.8											

Source: Dawson James.

Exhibit 19. Discounted-EPS Model.

Current Year	2019
Year of EPS	2029
Earnings Multiple	10
Discount Factor	30%
Selected Year EPS	7.30
NPV	5.3

		Discount Rate and Earnings Multiple Varies, Year is Constant					
		5%	10%	15%	20%	25%	30%
Earnings Multiple	2	8.63	5.68	3.81	2.60	1.80	1.26
	5	21.58	14.20	9.52	6.49	4.49	3.16
	10	43.16	28.40	19.03	12.98	8.99	6.31
	15	64.74	42.59	28.55	19.47	13.48	9.47
	20	86.32	56.79	38.07	25.95	17.97	12.63
	25	107.90	70.99	47.58	32.44	22.47	15.79
	30	129.48	85.19	57.10	38.93	26.96	18.94
	35	151.07	99.39	66.62	45.42	31.45	22.10

Source: Dawson James.

Exhibit 20. Sum-of-the-Parts Model.

	LT Gr	Discount Rate	Yrs to Mkt	% Success	Peak Sales (M)	NPV
Spinal Cod Paralysis	1%	30%	3	30%	$222	$765
NPV						$0.26
Dry Macular Degeneration	1%	30%	3	30%	$5,052	$17,421
NPV						$5.94
Renevia	1%	30%	2	50%	$40	$139
NPV						$0.10
Net Margin						70%
Shares Outstanding (M) in 2029E						280
Total						$6.3

Source: Dawson James.

Risk Analysis

Clinical and regulatory risk. BioTime is currently in a Phase 1/2a clinical trial in both of its pipeline products focused on spinal cord injury and macular degeneration. There is no assurance that either product will be approved for any additional indications and even if approved, will be reimbursed by insurance or successfully commercialized.

Commercial risk. The focus of the company is on successfully developing their products and eventually bringing them to the mass market. It is important to note that the market opportunity in macular degeneration is large and may take precedence over that of spinal cord injury opportunity. 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. BioTime management is new, with a new CEO and CFO. BioTime's 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 relatively soon, 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.

Merger Risk. We assume the acquisition of Asterias will close. This may fail to happen.

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

Subsidiary Risk. We assume there is value in the ownership of AGEX and Oncycte, but we are not forecasting or modeling the value of these minority-owned companies.

Exhibit 21. Income Statement.

Biotime: Income Statement ($000)																	
YE December 31	2017A	1Q18A	2Q18A	3Q18A	4Q18E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E
Spinal Cord Injury Therapy								-	-	2,866	11,695	17,895	30,424	46,554	94,979	129,184	130,476
Dry Macular Degeneration									-	-	674,532	1,030,069	1,396,272	1,772,071	2,156,441	2,600,414	2,971,902
Renevia								-	542	1,504	12,034	17,327	23,581	27,067	27,065	27,062	26,791
Net revenue									-	2,866	686,226	1,047,963	1,426,697	1,818,625	2,790,530	2,729,598	3,102,378
Grant Revenues		326	1,941	718	600	3,585	3,621	3,657	3,694	3,731	3,768	3,806	3,844	3,882	3,921	3,960	4,000
Royalties from Product Sales and license fees		136	91	85	80	392	396	400	404	408	412	416	420	424	429	433	437
Subscription & Advertisement Revenues		239	333	119	115	806	814	822	830	839	847	856	864	873	882	890	899
Sales of Research Products & Services		-	182	60	55	297	300	303	306	309	312	315	318	322	325	328	331
Total Revenue		**701**	**2,547**	**982**	**850**	**5,080**	**5,131**	**5,182**	**5,234**	**8,152**	**691,566**	**1,053,356**	**1,432,143**	**1,824,126**	**2,796,086**	**2,735,209**	**3,108,045**
Cost of Goods (sales)		(109)	(106)	(35)		(250)	-	-	-	(831)	(192,143)	(261,991)	(342,407)	(327,352)	(446,485)	(409,440)	(465,357)
										29%	28%	25%	24%	18%	16%	15%	15%
Research & Development		(5,935)	(6,358)	(4,882)	(5,000)	(22,175)	(15,523)	(12,418)	(12,666)	(16,466)	(24,699)	(34,579)	(35,271)	(35,976)	(36,696)	(37,430)	(38,178)
Acquired in Process Research & Development		(800)				(800)											
General & Adminastrative		(5,936)	(5,227)	(6,422)	(5,500)	(23,085)	(16,160)	(12,928)	(23,270)	(46,539.36)	(47,005)	(47,475)	(47,950)	(48,429)	(48,913)	(49,402)	(49,896)
Total Expenses		(12,671)	(11,585)	(11,304)	(10,500)	(46,060)	(31,682)	(25,346)	(35,936)	(63,837)	(263,848)	(344,045)	(425,628)	(411,758)	(532,094)	(496,272)	(553,431)
Loss from Operation		13,372	14,132	(10,357)	(9,650)	7,497	(26,551)	(20,163)	(30,702)	(55,684)	427,718	709,311	1,006,516	1,412,368	2,263,992	2,238,938	2,554,614
Interest Income (expense)		52	52	174		278											
Gain on AgeX shares and deconsolidation of AgeX				78,511		78,511											
Gain on Sale equity method in Ascendance		3,215															
Gain / Loss Oncocyte		(37,419)	6,603	(734)		(31,550)											
Loss on Equity (Asterias)		(17,398)	(2,175)	(1,087)		(20,660)											
Unrealized Gain on marketable equity securities		215	397	23		635											
Other Income (expenses) net		(176)	379	14		217											
Total other income (expense), net				76,901		76,901											
Pretax Income		(51,511)	19,388	66,544	(9,650)	84,398	(26,551)	(20,163)	(30,702)	(55,684)	427,718	709,311	1,006,516	1,412,368	2,263,992	2,238,938	2,554,614
Net loss attributable to non-controling interest		-		181		181	-	-	-	-	-	-	-	-	-	-	-
Taxes													100,652	211,855	452,798	559,734	715,292
Tax Rate													10%	15%	20%	25%	28%
GAAP Net Income (Loss)		(38,139)	(4,646)	66,725	(9,650)	(20,660)	(26,551)	(20,163)	(30,702)	(55,684)	427,718	709,311	905,864	1,200,513	1,811,194	1,679,203	1,839,322
Total comprehensive loss		(38,139)	(4,646)	66,725	(9,650)	217	(26,551)	(20,163)	(30,702)	(55,684)	427,718	709,311	905,864	1,200,513	1,811,194	1,679,203	1,839,322
GAAP-EPS		(0.30)	0.03	0.53	(0.08)	0.18	(0.16)	(0.08)	(0.13)	(0.23)	1.74	2.87	3.65	4.82	7.25	6.69	7.30
GAAP-EPS (Dil)		(0.30)	(0.04)	0.53	(0.08)	0.11	(0.13)	(0.08)	(0.23)	(0.17)	(0.04)	0.08	0.32	0.60	0.87	1.12	1.12
Wgtd Avg Shrs (Bas)		126,869	126,873	126,878	128,147	127,192	169,259	239,765	243,965	244,942	245,923	246,908	247,898	248,891	249,888	250,889	251,894
Wgtd Avg Shrs (Dil)		126,869	126,873	126,973	128,243	127,239	207,234	266,783	271,456	272,543	273,635	274,731	275,832	276,937	278,046	279,160	280,278

Source: Dawson James estimates.

Companies mentioned in this report:

Asterias (AST)
AgeX (AGX)
Oncocyte (OCS)
Juvenescence (private)

Important Disclosures:

Price Chart:

Price target and ratings changes over the past three years:
Initiated – Buy – February 7, 2019 – Price Target $6.00

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Ratings Distribution	# of Companies	% of Total	# of Companies	% of Totals
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Market Underperform (Sell)	0	0%	0	0%
Total	53	100%	10	19%

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