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EQUITY RESEARCH
Company Report

September 25, 2017

Asterias Biotherapeutics (AST - $3.15)

Healthcare/Biotechnology

Ticker:	**AST**
Rating:	**Buy**
Price Target:	**$12.00**

Management Meetings Indicated Clinical Data Readouts On-track and Increased Interest by Investors

We recently hosted meetings with AST management and investors. Key takeaways and our impressions include:

- **AST-OPC1 in SCI study cohort 2 12-month and cohorts 3 and 4 data readouts remain on-track.** Management reiterated that cohort 2 12-month data readout remains on track for early 4Q17, possibly in October. In addition, the 6-month data readouts of cohorts 3 and 4 are also scheduled in early 1Q18 (Jan/Feb timeframe). Most investors view these two events as critical for further validation of AST-OPC1 in SCI treatment, as they potentially afford efficacy readout over a longer period and with a significant larger treated patient size. AST also guided potential FDA feedback in 1Q18 that likely facilitating Phase IIb trial design.
- **Investors increasingly interested in the VAC developments.** We have noticed that increasingly more investors are interested in the developments of the VAC-2 and VAC-1 programs. CPI is becoming a mainstay for treating multiple cancers, and more drugs of this class starting to reach the market. Many investors believe the newer generation of cancer vaccines could potentially become a novel immune-oncological therapy, possibly in a maintenance setting especially as a combined treatment with different combinations. AST indicated that the Cancer Research UK should start the VAC-2 in non-small cell lung cancer (NSCLC) Phase I/IIa study shortly. The study (see page 2) includes two parts: first for safety and second for testing efficacy. Both portions have a control arm (with HLA-A2 negative patients) to better and more accurately showcase the safety and potential efficacy. Data readout could start in 2018.
- **Potential partnership in Japan could be an upside.** With the tailwind of rather favorable legislation in Japan, the procedures and rules for clinical development and potential approval of regenerative medicine and cell therapies have been accelerated. As such, many Japanese companies are seeking good products to bring to market. Good potential exists for AST to consummate a Japanese partnership, possibly in 2018. If so, it might potentially only need to conduct a small clinical study in Japan before possibly filing for approval for AST-OPC1 in SCI.
- **Action.** We are reiterating our Buy rating and $12 target price. Our valuation is based on peer comparable, probability adjusted DCF and sum-of-the-parts analyses. We believe AST shares are undervalued given its differentiated and promising SCI treatment modality, and potentially positive multiple catalysts in next 18 months.

Trading Data:

Last Price (9/22/2017)	$3.15
52–Week High (11/18/2016)	$5.80
52–Week Low (4/12/2017)	$2.83
Market Cap. (MM)	$160
Shares Out. (MM)	42.934

Earnings Estimates: (per share)

(Dec)	1Q	2Q	3Q	4Q	FY	P/E
FY-17E	-0.13A	-0.18A	-0.16	-0.18	-0.65	N.A.
FY-16A	-0.27	-0.12	-0.24	-0.20	-0.83	N.A
FY-15A	-0.09	-0.10	-0.09	-0.13	-0.42	N.A.
FY-14A	-0.07	-0.09	-0.05	-0.11	-0.33	N.A.

Source: Laidlaw & Company estimates

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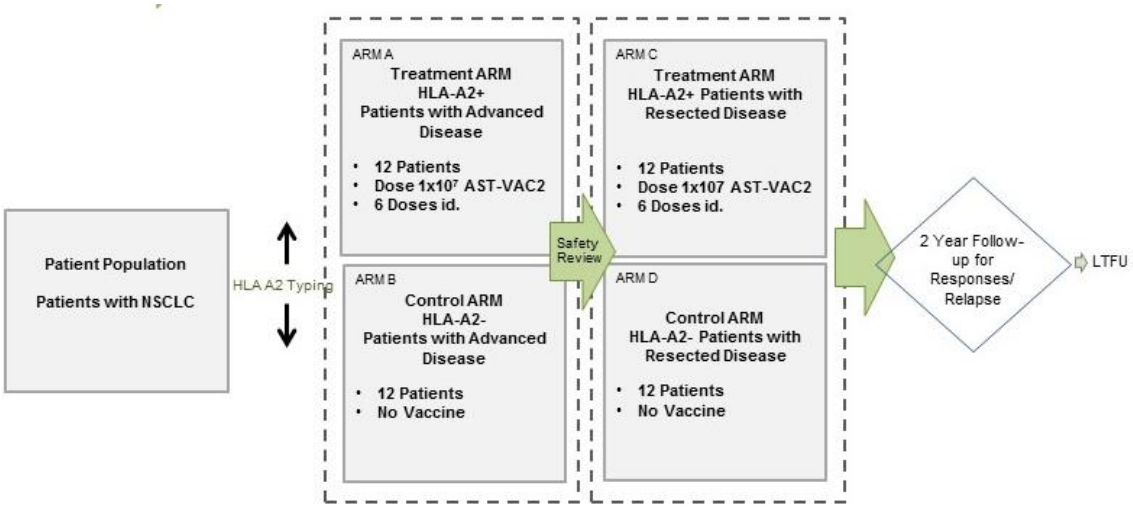
- **More deep-dive by investors.** With increasingly more prospective investors examining AST especially from the scientific and clinical angle, several aspects are worth highlighting: 1) the immediately objective of AST-OPC1 (oligodendrocyte progenitor cells) in the treatment of SCI patients to replenish the lost or damaged oligodendrocyte at the injury sites. With this process, including the secretion of neurotrophic factors, the treatment's ultimate goal is to restore certain levels of nerve connection leading to motor function improvements. Oligodendrocyte are naturally born cells located at the white matter of the spinal cord. This differentiates AST's treatment from other prior cell therapies in SCI that have used Schwann cells or mesenchymal stem cells, which all are not naturally existing at the spinal cord; and 2) for comparing VAC-2 to Provenge (developed by Dendreon), the major differences in addition to that Provenge was developed using more dated technology, is that Provenge require leukapheresis multiple times for collecting cells before each administration; while VAC-2 is allogenic and can be administrated multiple times without taking cells from patients.

Figure 1: Study design of VAC-2 in NSCLC Phase I/IIa study



Source: Company report.

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Anticipated milestones in 2017 and beyond

Product	Indication	Event	Timing	Importance
AST-OPC1	Subacute spinal cord injury (SCI) cervical complete (AIS-A at C5-C7)	Report 10MM cell 12-month results	**4Q17**	****
		Report 20MM cell 6-month results	**Jan. '18**	****
		Report 20MM cell 12-month results	**4Q18**	***
	Subacute spinal cord injury (SCI) cervical incomplete (AIS-B at C5-C7)	Report 10MM cell 6-month results	**Jan. '18**	****
		Complete patient enrollment of 20MM cell trial	**1Q18**	***
		Report 10MM cell 12-month results	**4Q18**	****
		Report 20MM cell 6-month results	**3Q18**	****
	Subacute spinal cord injury (SCI) cervical	More formal discussion with the FDA for possible Phase II and III trial	**1Q18**	***
		Potentially finalize Phase IIb trial design after FDA discussion	**1H18**	***
		Potentially start Phase IIb trial	**2H18**	***
AST-VAC1	Acute myeloid leukemia (AML)	Potentially start Phase IIb confirmatory trial	**2018**	***
AST-VAC2	Non-small cell lung cancer (NSCLC)	Potentially start Phase I/IIa trial	**3Q17**	***

***** / ***** Major catalyst event that could impact share price very significantly while *** event is more informative*

Source: Laidlaw & Company and company presentation

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Major Risks

Clinical study failure could have a major impact on AST share value. Despite promising pre-clinical and clinical results of the company's lead product, AST-OPC1, it remains too early to predict the long-term safety and efficacy outcomes from the upcoming clinical studies. Given that clinical validation has not been fully established, near term, it would be critical for the additional studies of the ongoing Phase I/II trial to demonstrate efficacy and a positive safety profile after a longer follow-up, higher dosage and broader patient population in order to increase the assets and shareholder value. Negative results of ongoing and future clinical studies could have a materially negative impact on the shareholder value; especially since the company has a relatively diverse-limited pipeline profile. In addition, given there has been very limited progress over the last two decades in developing therapeutics for treating SCI, the overall risks in developing an effective treatment in this area could be higher than in other disease areas.

Yet-to-be-validated pluripotent stem cell platform could remain uncertain. Although stem cell-based therapies have been tested in many clinical trials in recent years; there is currently no pluripotent stem cell-based therapy approved for the treatment of spinal cord injury or other disease indications. As such, clinical risks for pluripotent stem cell-based therapies are higher than similar products generated from other more proven development platforms.

Product may not be approved or reach anticipated sales. Although AST's current pipeline products have exhibited the potential to generate positive clinical outcomes from current and future trials; it remains too early to project whether any of these products would be approved by regulatory agencies. Even if the products were to enter the market, sales could be significantly below projections due to the specific product label under approval, physician consensus for prescribing the drug, changes of treatment paradigms, entrance of competitors, and the possible changes in pricing flexibility that could potentially have a negative impact on payer reimbursement. Other potential commercial risks also include the societal or political pressure that could limit premium pricing capability for many orphan drugs moving forward. Further, a below expectation revenue outlook could also negatively affect AST shareholder value.

Additional financings could dilute shareholder value. Although the company currently has ~$34MM total cash as of the end of February 2017, AST would most likely need more financial resources going forward if they want to expand and further develop their pipeline unless the company can continuously explore un-dilutive financial sources. Should the future operational expenses significantly increase, especially in the areas of R&D and SG&A, products not receive FDA approval, or product revenue not reach expectations; the company might need to issue new equity to raise additional cash. Under such a scenario, the share value of existing shareholders could be diluted.

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Figure 1: Income Statement

Asterias Biotherapeutics – Income Statement

($'000)	2014	2015	2016	1Q17	2Q17	3Q17E	4Q17E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Revenue																
AST-OPC1 US sales													10,466	30,891	79,246	174,950
AST-OPC1 ex-US royalties and COGS													0	0	3,338	14,931
AST-OPC1 total revenue													**10,466**	**30,891**	**82,584**	**189,881**
AST-VAC1 in AML revenues															37,131	95,994
AST-VAC2 in NSCLC revenues																85,629
Total product revenues													10,466	30,891	119,714	371,505
Royalties from product sales	189	535	381	116	25	89	159	389	416	433	450	468	487	506	527	548
Sale of cell lines		40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grant income	1,034	3,007	6,572	1,894	291	1,500	70	3,755	3,905	4,061	4,224	4,393	4,569	4,751	4,941	5,139
Total revenue	1,224	3,582	6,953	2,010	316	1,589	229	4,144	4,321	4,494	4,674	4,861	15,522	36,149	125,182	377,192
COGS of therapeutic products													(2,093)	(6,178)	(24,489)	(76,744)
Cost of sales	(95)	(268)	(127)	(53)	(18)	(37)	(67)	(175)	(175)	(182)	(189)	(197)	205	(5,966)	(24,268)	(76,514)
Total gross profit	1,129	3,314	6,826	1,957	298	1,552	162	3,969	4,147	4,312	4,485	4,664	15,726	36,857	106,852	266,396
Expenses																
Research and development	(13,310)	(17,321)	(25,468)	(6,598)	(6,984)	(7,005)	(7,075)	(27,662)	(31,811)	(37,855)	(45,805)	(53,592)	(57,343)	(59,637)	(57,848)	(52,063)
General and administrative	(5,280)	(7,901)	(15,481)	(4,466)	(1,847)	(1,884)	(1,908)	(10,105)	(10,914)	(11,896)	(12,848)	(13,747)	(14,434)	(15,156)	(15,914)	(16,710)
Marketing and sales													(20,000)	(25,000)	(29,250)	(31,298)
Total operating costs and expenses	(18,590)	(25,222)	(40,949)	(11,064)	(8,831)	(8,889)	(8,983)	(37,767)	(42,725)	(49,751)	(58,653)	(67,339)	(91,778)	(99,793)	(103,012)	(100,070)
Operating Incomes (losses)	(17,461)	(21,908)	(34,123)	(9,107)	(8,533)	(7,337)	(8,821)	(33,798)	(38,578)	(45,439)	(54,168)	(62,675)	(76,051)	(62,936)	3,840	166,325
Other Income/(Expense)																
Change in fair value on warrant liability			(3,107)	2,954	(56)	(349)	(450)	2,099	(2,100)	(1,200)	(1,200)	(1,200)	(1,200)	(1,200)	(1,200)	(1,200)
Interest expense, net	(10)	(341)	(548)	(134)	(114)	(207)	(240)	(695)	(730)	(1,599)	(1,598)	(1,597)	(1,629)	(1,662)	(1,695)	(1,729)
Other income (expense), net	(2)	(6)	(36)		(25)	40	50	65	72	79	87	95	105	115	127	139
Total other income (expense), net	(12)	(347)	(3,691)	2,820	(195)	(516)	(640)	1,469	(2,758)	(2,720)	(2,711)	(2,702)	(2,724)	(2,746)	(2,768)	(2,789)
Pretax income	(17,473)	(22,255)	(37,814)	(6,287)	(8,728)	(7,853)	(9,461)	(32,329)	(41,337)	(48,159)	(56,879)	(65,376)	(78,776)	(65,683)	1,072	163,536
Deferred income tax benefit	7,376	7,252	2,324	0	0	0	0	0	2,789	2,860	2,860	2,860	2,860	2,860	(397)	(60,508)
Net Income (Loss)	**(10,097)**	**(15,003)**	**(35,490)**	**(6,287)**	**(8,728)**	**(7,853)**	**(9,461)**	**(32,329)**	**(38,548)**	**(45,299)**	**(54,019)**	**(62,516)**	**(75,916)**	**(62,823)**	**675**	**103,028**
Basic and diluted net loss per share	($0.33)	($0.42)	($0.83)	($0.13)	($0.18)	($0.16)	($0.18)	($0.65)	($0.71)	($0.79)	($0.89)	($1.00)	($1.12)	($0.93)	$0.01	$1.52
Weighted average common shares outstanding: basic and undiluted	30,720	35,443	42,943	48,357	48,511	48,551	52,551	49,493	54,493	57,493	60,493	62,493	67,493	67,593	67,693	67,793
Margin Analysis (% of Sales/Revenue)																
Costs of goods	-50%	-50%	-33%	-42%	-42%	-42%	-42%	-45%	-42%	-42%	-42%	-42%	-42%	-42%	-42%	-42%
R&D	-1088%	-484%	-366%	-328%	-2210%	-441%	-3090%	-668%	-736%	-842%	-980%	-1102%	-369%	-165%	-46%	-14%
SG&A	-431%	-221%	-223%	-222%	-584%	-119%	-833%	-244%	-253%	-265%	-275%	-283%	-93%	-42%	-13%	-4%
Operating Income (loss)	-1427%	-612%	-491%	-453%	-2700%	-462%	-3852%	-816%	-893%	-1011%	-1159%	-1289%	-490%	-174%	3%	44%
Pretax	-1428%	-621%	-544%	-313%	-2762%	-494%	-4132%	-780%	-957%	-1072%	-1217%	-1345%	-508%	-182%	1%	43%
Tax Rate													37%	37%	37%	37%
Net Income	-825%	-419%	-510%	-313%	-2762%	-494%	-4132%	-780%	-892%	-1008%	-1156%	-1286%	-489%	-174%	1%	27%
Financial Indicator Growth Analysis (YoY%)																
Total Revenue	NA	193%	94%	26%	-79%	-23%	-87%	-40%	4%	4%	4%	4%	219%	133%	246%	201%
R&D	NA	30%	47%	4%	16%	34%	-10%	9%	15%	19%	21%	17%	7%	4%	-3%	-10%
SG&A	NA	50%	96%	-29%	-28%	-55%	-20%	-35%	8%	9%	8%	7%	5%	5%	5%	5%
Operating Income (Losses)	NA	25%	62%	-12%	3%	-6%	-13%	-8%	13%	16%	18%	15%	36%	9%	3%	-3%
Pretax Income	NA	27%	70%	-44%	56%	-32%	0%	-15%	28%	17%	18%	15%	20%	-17%	-102%	15160%
Net Income	NA	49%	137%	-39%	69%	-26%	1%	-9%	19%	18%	19%	16%	21%	-17%	-101%	15160%
EPS	NA	29%	97%	-52%	46%	-31%	-11%	-22%	8%	11%	13%	12%	12%	-17%	-101%	15137%

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Source: Bloomberg LP; Company reports; Laidlaw & Company estimates

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Additional information available upon request.

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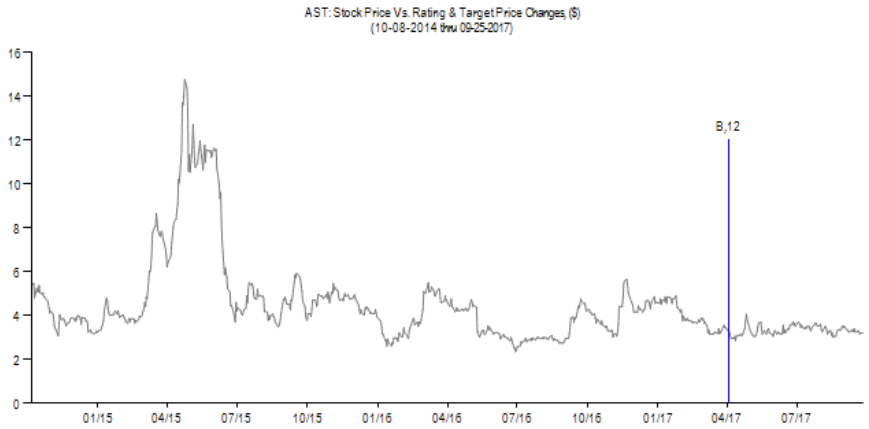

3 Year Rating Change History

Date	Rating	Closing Price ($)
04/03/2...	Buy (B)	3.25

3 Year Price Change History

Date	Target Price ($)	Closing Price, ($)
04/03/2...	12.00	3.25

Source: Laidlaw & Company **Created by: Blue-Compass.net**

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			Investment Banking	Brokerage
Strong Buy (SB)	Expected to significantly outperform the sector over 12 months.	0.00%	0.00%	0.00%
Buy (B)	Expected to outperform the sector average over 12 months.	64.58%	31.25%	2.08%
Hold (H)	Expected returns to be in line with the sector average over 12 months.	4.17%	0.00%	0.00%
Sell (S)	Returns expected to significantly underperform the sector average over 12 months.	0.00%	0.00%	0.00%

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Dendreon (DNDN – Not Rated)

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