LAIDLAW & COMPANY
Est. 1842
London
New York
San Francisco
Boston

EQUITY RESEARCH
Company Report

July 17, 2017

Asterias Biotherapeutics (AST - $3.40)

Healthcare/Biotechnology

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

Management Updates and Enrollment/Dosing Completion of AIS-B SCI $10x10^6$ Cell and AIS-A SCI $20x10^6$ Cell Cohorts

Sandwiched between the announcements of completed enrollment and dosing of $10x10^6$ AST-OPC1 cells in AIS-B SCI (cohort 4), and $20x10^6$ AST-OPC1 cells in AIS-A SCI (cohort 3) cohorts, we hosted meetings with AST management and investors. Key takeaways include:

- **Cohorts 3 and 4 topline results expected in 1Q18.** AST reported that the patient enrollment and dosing of $10x10^6$ AST-OPC1 cells in AIS-B SCI cohort (n=5) and $20x10^6$ AST-OPC1 cells in AIS-A SCI cohort (n=5) of the ongoing Phase I/IIa trial have completed. Top-line six-month follow-up results are expected in January 2018. Safety, improvements of upper extremity motor score (UEMS) and motor level (by ISNCSCI examinations) are the major endpoints.
- **Maturation and expansion of SCiStar study data are the key focus of investors.** The overall consensus of many investors is that the potential completion and success of the SCiStar trial would be critical for enhancing AST share value and for gaining a greater buy-in on the AST-OPC1 platform. As such, data readouts in 1Q18 could be critical, not only for potentially positive data from an additional AIS-B SCI cohort, but also having reported efficacy data from a larger number of patients (from 6 to 15). In addition, the 12-month follow-up results of cohort 2 (AIS-A SCI $10x10^6$ cells) could be available in early 4Q17 with data from all six patients instead of five. Should the outcome be positive, which we believe is likely, it would demonstrate continued persistency of treatment effect. This is important given that a competitor program failed to show enduring effect at 12 months despite earlier promising data. Under the recently announced modified recruitment criteria (C4- injured included and therapy window of 21-42 days) more patients could be enrolled into cohort 5.
- **Phase IIb trial could start in 2H18.** Should the ongoing SCiStar trial show a promising outcome and receive more FDA feedback, AST could start a placebo-controlled Phase IIb trial in 2018, possibly in mid- to 2H18. AST could potentially incur much less costs for the study if they apply for and successfully receive funding support from the California Institute of Regeneration Medicine (CIRM).
- **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 (7/14/2017)	$3.40
52–Week High (11/18/2016)	$5.80
52–Week Low (8/26/2016)	$2.54
Market Cap. (MM)	$172
Shares Out. (MM)	42.934

Earnings Estimates: (per share)

(Dec)	1Q	2Q	3Q	4Q	FY	P/E
FY-17E	-0.13A	-0.16	-0.17	-0.16	-0.62	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

Yale Jen, Ph.D.
Managing Director/Senior
Biotechnology Analyst
(212) 953-4978
yjen@laidlawltd.com

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)	Complete patient enrollment of 20MM cell trial	**3Q17**	***
		Report 10MM cell 12-month results	**4Q17**	****
		Report 20MM cell 6-month results	**1Q18**	****
		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	**1Q18**	****
		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	Conduct discussion with the FDA for possible Phase III trial	**Mid-2017**	***
		Potentially finalize Phase IIb trial design after FDA discussion	**2H17**	***
		Potentially start Phase IIb trial	**2018**	***
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	**Mid-17**	***

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

Source: Laidlaw & Company and company presentation

Yale Jen, Ph.D.
yjen@laidlawltd.com

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.

Yale Jen, Ph.D.
yjen@laidlawltd.com

Figure 1: Income Statement

Asterias Biotherapeutics – Income Statement

($'000)	2014	2015	2016	1Q17	2Q17E	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	110	89	159	474	507	527	549	571	593	617	642	667
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	1,720	1,580	1,670	6,864	7,139	7,424	7,721	8,030	8,351	8,685	9,033	9,394
Total revenue	1,224	3,582	6,953	2,010	1,830	1,669	1,829	7,338	7,646	7,952	8,270	8,600	19,411	40,194	129,389	381,566
COGS of therapeutic products													(2,093)	(6,178)	(24,489)	(76,744)
Cost of sales	(95)	(268)	(127)	(53)	(46)	(37)	(67)	(203)	(213)	(222)	(230)	(240)	249	(5,919)	(24,220)	(76,464)
Total gross profit	1,129	3,314	6,826	1,957	1,784	1,632	1,762	7,135	7,433	7,730	8,039	8,361	19,660	36,810	106,803	266,345
Expenses																
Research and development	(13,310)	(17,321)	(25,468)	(6,598)	(7,410)	(7,543)	(7,769)	(29,320)	(33,718)	(40,124)	(48,550)	(56,804)	(60,780)	(63,211)	(61,315)	(55,183)
General and administrative	(5,280)	(7,901)	(15,481)	(4,466)	(2,456)	(2,530)	(2,606)	(12,058)	(13,023)	(14,195)	(15,330)	(16,404)	(17,224)	(18,085)	(18,989)	(19,939)
Marketing and sales													(20,000)	(25,000)	(29,250)	(31,298)
Total operating costs and expenses	(18,590)	(25,222)	(40,949)	(11,064)	(9,866)	(10,073)	(10,375)	(41,378)	(46,740)	(54,319)	(63,881)	(73,207)	(98,004)	(106,296)	(109,554)	(106,419)
Operating Incomes (losses)	(17,461)	(21,908)	(34,123)	(9,107)	(8,082)	(8,441)	(8,613)	(34,243)	(39,308)	(46,589)	(55,841)	(64,846)	(78,344)	(69,486)	(2,751)	159,926
Other Income/(Expense)																
Change in fair value on warrant liability			(3,107)	2,954	(190)	(349)	(450)	1,965	(2,100)	(1,200)	(1,200)	(1,200)	(1,200)	(1,200)	(1,200)	(1,200)
Interest expense, net	(10)	(341)	(548)	(134)	(169)	(207)	(240)	(750)	(788)	(1,599)	(1,598)	(1,597)	(1,629)	(1,662)	(1,695)	(1,729)
Other income (expense), net	(2)	(6)	(36)		28	40	50	118	130	143	157	173	190	209	230	253
Total other income (expense), net	(12)	(347)	(3,691)	2,820	(331)	(516)	(640)	1,333	(2,758)	(2,656)	(2,641)	(2,624)	(2,639)	(2,652)	(2,665)	(2,676)
Pretax income	(17,473)	(22,255)	(37,814)	(6,287)	(8,413)	(8,957)	(9,253)	(32,910)	(42,065)	(49,245)	(58,482)	(67,471)	(80,982)	(72,138)	(5,415)	157,250
Deferred income tax benefit	7,376	7,252	2,324		730	750	698	2,178	2,789	2,860	2,860	2,860	2,860	2,860	2,004	(58,183)
Net Income (Loss)	**(10,097)**	**(15,003)**	**(35,490)**	**(6,287)**	**(7,683)**	**(8,207)**	**(8,555)**	**(30,732)**	**(39,276)**	**(46,385)**	**(55,622)**	**(64,611)**	**(78,122)**	**(69,278)**	**(3,412)**	**99,068**
Basic and diluted net loss per share	($0.33)	($0.42)	($0.83)	($0.13)	($0.16)	($0.17)	($0.16)	($0.62)	($0.72)	($0.81)	($0.92)	($1.04)	($1.16)	($1.03)	($0.05)	$1.46
Weighted average common shares outstanding: basic and undiluted	30,720	35,443	42,943	48,357	48,377	48,417	52,417	49,392	54,392	57,392	60,392	62,392	67,392	67,492	67,592	67,692
Margin Analysis (% of Sales/Revenue)																
Costs of goods	-50%	-50%	-33%	-42%	-42%	-42%	-42%	-43%	-42%	-42%	-42%	-42%	-42%	-42%	-42%	-42%
R&D	-1088%	-484%	-366%	-328%	-405%	-452%	-425%	-400%	-441%	-505%	-587%	-660%	-313%	-157%	-47%	-14%
SG&A	-431%	-221%	-223%	-222%	-134%	-152%	-142%	-164%	-170%	-179%	-185%	-191%	-89%	-45%	-15%	-5%
Operating Income (loss)	-1427%	-612%	-491%	-453%	-442%	-506%	-471%	-467%	-514%	-586%	-675%	-754%	-404%	-173%	-2%	42%
Pretax	-1428%	-621%	-544%	-313%	-460%	-537%	-506%	-448%	-550%	-619%	-707%	-785%	-417%	-179%	-4%	41%
Tax Rate													37%	37%	37%	37%
Net Income	-825%	-419%	-510%	-313%	-420%	-492%	-468%	-419%	-514%	-583%	-673%	-751%	-402%	-172%	-3%	26%
Financial Indicator Growth Analysis (YoY%)																
Total Revenue	NA	193%	94%	26%	19%	-20%	4%	6%	4%	4%	4%	4%	126%	107%	222%	195%
R&D	NA	30%	47%	4%	23%	44%	-1%	15%	15%	19%	21%	17%	7%	4%	-3%	-10%
SG&A	NA	50%	96%	-29%	-5%	-40%	9%	-22%	8%	9%	8%	7%	5%	5%	5%	5%
Operating Income (Losses)	NA	25%	62%	-12%	15%	7%	1%	1%	13%	16%	18%	15%	34%	8%	3%	-3%
Pretax Income	NA	27%	70%	-44%	50%	-22%	-2%	-13%	28%	17%	19%	15%	20%	-11%	-92%	-3004%
Net Income	NA	49%	137%	-39%	49%	-23%	-8%	-13%	28%	18%	20%	16%	21%	-11%	-95%	-3004%
EPS	NA	29%	97%	-52%	29%	-28%	-20%	-25%	16%	12%	14%	12%	12%	-11%	-95%	-2999%

Yale Jen, Ph.D. 212-953-4978

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

Yale Jen, Ph.D.
yjen@laidlawltd.com

DISCLOSURES:

ANALYST CERTIFICATION

The analyst responsible for the content of this report hereby certifies that the views expressed regarding the company or companies and their securities accurately represent his personal views and that no direct or indirect compensation is to be received by the analyst for any specific recommendation or views contained in this report. Neither the author of this report nor any member of his immediate family or household maintains a position in the securities mentioned in this report.

EQUITY DISCLOSURES

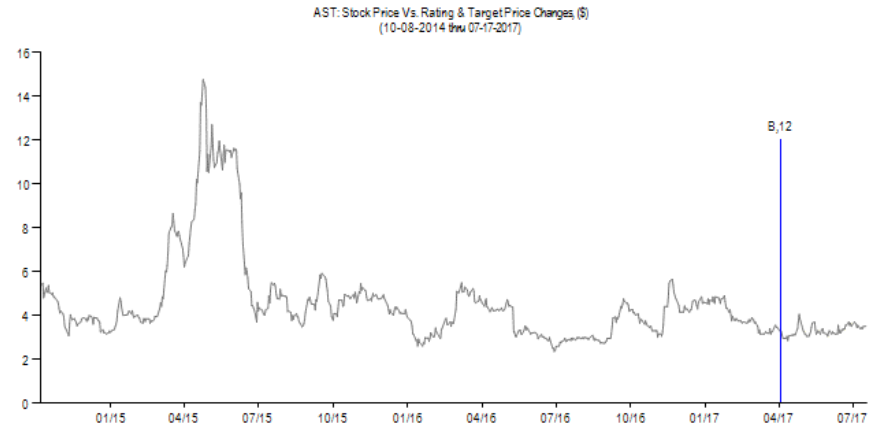
For the purpose of ratings distributions, regulatory rules require the firm to assign ratings to one of three rating categories (i.e. Strong Buy/Buy-Overweight, Hold, or Underweight/Sell) regardless of a firm's own rating categories. Although the firm's ratings of Buy/Overweight, Hold, or Underweight/Sell most closely correspond to Buy, Hold and Sell, respectively, the meanings are not the same because our ratings are determined on a relative basis against the analyst sector universe of stocks. An analyst's coverage sector is comprised of companies that are engaged in similar business or share similar operating characteristics as the subject company. The analysis sector universe is a sub-sector to the analyst's coverage sector, and is compiled to assist the analyst in determining relative valuations of subject companies. The composition of an analyst's sector universe is subject to change over time as various factors, including changing market conditions occur. Accordingly, the rating assigned to a particular stock represents solely the analyst's view of how that stock will perform over the next 12-months relative to the analyst's sector universe.

Additional information available upon request.

Laidlaw & Co (UK) Ltd. has not provided any investment banking services for the company (ies) mentioned in this report over the last 12 months.

RATINGS INFORMATION

Rating and Price Target Change History



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**

Laidlaw & Company Rating System*		% of Companies Under Coverage With This Rating	% of Companies for which Laidlaw & Company has performed services for in the last 12 months	
			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.	64.44%	31.11%	2.22%
Hold (H)	Expected returns to be in line with the sector average over 12 months.	2.22%	0.00%	0.00%
Sell (S)	Returns expected to significantly underperform the sector average over 12 months.	0.00%	0.00%	0.00%

ADDITIONAL COMPANIES MENTIONED

ADDITIONAL DISCLOSURES

As of the date of this report, neither the author of this report nor any member of his immediate family or household maintains an ownership position in the securities of the company (ies) mentioned in this report.

This report does not provide individually tailored investment advice and has been prepared without regard to the individual financial circumstances and objectives of persons who receive it. Laidlaw & Co (UK), Ltd. recommends that investors independently evaluate particular investments and strategies, and encourages investors to seek the advice of a financial adviser. The appropriateness of a particular investment or strategy will depend on an investor's individual circumstances and objectives. The securities, instruments, or strategies discussed in this report may not be suitable for all investors, and certain investors may not be eligible to purchase or participate

in some or all of them. This report is not an offer to buy or sell or the solicitation of an offer to buy or sell any security/instrument or to participate in any particular trading strategy.

Associated persons of Laidlaw & Co (UK), Ltd not involved in the preparation of this report may have investments in securities/instruments or derivatives of securities/instruments of companies mentioned herein and may trade them in ways different from those discussed in this report. While Laidlaw & Co (UK), Ltd., prohibits analysts from receiving any compensation. Bonus or incentive based on specific recommendations for, or view of, a particular company, investors should be aware that any or all of the foregoing, among other things, may give rise to real or potential conflicts of interest.

With the exception of information regarding Laidlaw & Co (UK), Ltd. this report is based on public information. Laidlaw & Co (UK), Ltd makes every effort to use reliable, comprehensive information, but we make no representation that it is accurate or complete and it should not be relied upon as such. Any opinions expressed are subject to change and Laidlaw & Co (UK), Ltd disclaims any obligation to advise you of changes in opinions or information or any discontinuation of coverage of a subject company. Facts and views presented in this report have not been reviewed by, and may not reflect information known to, professionals in other Laidlaw & Co (UK), Ltd business areas. Laidlaw & Co (UK), Ltd associated persons conduct site visits from time to time but are prohibited from accepting payment or reimbursement by the company of travel expenses for such visits. The value of and income from your investments may vary because of changes in interest rates, foreign exchange rates, default rates, prepayment rates, securities/instruments prices. market indexes, operational or financial conditions of companies or other factors. There may be time limitations on the exercise of options or other rights in securities/instruments transactions. Past performance is not necessarily a guide to future performance. Estimates of future performance are based on assumptions that may not be realized. If provided, and unless otherwise stated, the closing price on the cover page is that of the primary exchange for the subject company's securities/instruments.

Any trademarks and service marks contained in this report are the property of their respective owners. Third-party data providers make no warranties or representations of any kind relating to the accuracy, completeness, or timeliness of the data they provide and shall not have liability for any damages of any kind relating to such data. This report or any portion thereof may not be reprinted, sold or redistributed without the written consent of Laidlaw & Co (UK), Ltd. This report is disseminated and available primarily electronically, and, in some cases, in printed form.

The information and opinions in this report were prepared by Laidlaw & Co (UK), Ltd. For important disclosures, please see Laidlaw & Co (UK), Ltd.'s disclosure website at www.Laidlawltd.com, or contact your investment representative or Laidlaw & Co (UK), Ltd at 546 Fifth Ave, 5th Floor, New York, NY 10036 USA.

Yale Jen, Ph.D.
yjen@laidlawltd.com

NOTES:

Yale Jen, Ph.D.
yjen@laidlawltd.com