Avalanche Biotechnologies

Equity Research

Company Update

March 25, 2015

Price: $41.04 (03/25/2015)
Price Target: $55.00 (Prior $45.00)

OUTPERFORM (1)

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Key Data

Symbol	NASDAQ: AAVL
52-Week Range:	$62.48 - 22.00
Market Cap (MM):	$1,035.1
Net Debt (MM):	$(159.4)
Cash/Share:	$7.01
Dil. Shares Out (MM):	25.2
Enterprise Value (MM):	$875.7
ROIC:	NA
ROE (LTM):	NA
BV/Share:	$6.57
Dividend:	NA

FY (Dec)	2014A	2015E	2016E
Earnings Per Share			
Q1	$(0.45)	$(0.34)	-
Prior Q1	*-*	*$(0.22)*	*-*
Q2	$(2.27)	$(0.35)	-
Prior Q2	*-*	*$(0.25)*	*-*
Q3	$(0.50)	$(0.36)	-
Prior Q3	*-*	*$(0.27)*	*-*
Q4	$(0.46)	$(0.36)	-
Prior Q4	*$(0.19)*	*$(0.30)*	*-*
Year	$(2.47)	$(1.40)	$(1.85)
Prior Year	*$(1.91)*	*$(1.05)*	*$(1.40)*
P/E	NM	NM	NM
Revenue (MM)			
Year	$0.6	$0.8	$0.0
Prior Year	*$0.0*	*$0.0*	*-*
EV/S	1,459.5x	1,094.6x	-

AAVL R&D Day: Adding Color To The Pipeline

The Cowen Insight

Today Avalanche hosted an analyst meeting in New York. Results from AVA-101's Ph. IIa in wet AMD are on-track for mid-2015, and 36 month data from its Ph. I will be presented in H2:15. Avalanche also unveiled a new program in color blindness for which INDs are expected in H2:2016. We are increasing our price target from $45 to $55 and continue to think that AAVL is undervalued for its pipeline.

Data From AVA-101's Ph. IIa On Track For Mid-Year.

The primary endpoint of the trial is safety, and 52-week analyses of visual acuity and optical coherence tomography (OCT) are secondary endpoints. AAVL has previously disclosed that an interim safety analysis conducted in 2014 revealed no safety issues. For the first time this morning AAVL provided a comparison of some baseline characteristics between the Phase I and IIa. Specifically, in the Ph. IIa patients have better baseline visual acuity (63 vs 36.5), and less time has elapsed since their diagnosis (16.2 months vs 49.2 months). Both trials were conducted predominantly in treatment experienced patients, with no treatment naive patients in the Ph. I (8 patients total) and only 4 treatment naive patients of 32 total in the Ph. IIa.

In light of the differences in enrollment criteria between Ph. I and Ph. II, investors have debated how efficacy data from Ph. II will be interpreted. Management noted that the potency of AVA-101 will be judged by its impact on OCT, visual acuity, and the need for rescue injections. With three different parameters in play, management is hesitant to define the minimum requirements for a successful outcome. Experts at the meeting suggest that AVA-101 would appear promising if the majority of patients' retinas remain dry with no (or minimal) need for rescue injections, and with stable to modestly increasing visual acuity.

36-Month Data From AVA-101's Ph. I To Be Released In H2:15.

One year data from AVA-101's Ph. I trial demonstrated that patients gained vision with minimal need for rescue injections. Patients continue to be followed. Thirty-six month data from the trial will be collected and presented during H2:15. Management noted this data will include analyses of safety as well as efficacy, though the efficacy data may be difficult to interpret given that no other efficacy measures have been collected on the patients as part of the trial since the 12 month analysis.

Preclinical Development Of AVA-201 and AVA-311 Continues.

AVA-201 for prevention of wet AMD: For the first time, the company showed data in rodents to indicate that it is getting close to identifying a viable vector for intravitrial delivery.

AVA-311 for X-linked retinoschisis: Avalanche announced it is also coming close to finalizing vector selection for AVA-311, the first candidate in the Regeneron collaboration.

At A Glance

Our Investment Thesis

Avalanche's lead product AVA-101 is completing a Phase IIa study in wet AMD, from which data are expect in mid-2015. AVA-101 is a subretinal injection of AAV that delivers the naturally occurring VEGF inhibitor sFlt-1 to the back of the eye. AVA-101 could be a functional cure for wet AMD. In a Phase I/II trial, subjects given AVA-101 gained vision with minimal need for additional treatments over a year. Wet AMD is a substantial market that we estimate was approximately $10B worldwide (at branded pricing) in 2014. Even minority share could garner AVA-101 multi-$B in sales. Our DCF analysis suggests that Avalanche is undervalued based on the promise of AVA-101 alone, with no contribution from the rest of its pipeline.

Forthcoming Catalysts

- Results from AVA-101's Ph. IIa mid-2015
- Release of 36 month data from AVA-101's Phase I
- Advancement of AVA-311 and other compounds in Avalanche's collaboration with Regeneron
- IND filing for AVA-322 and AVA-323 in color blindness (H2:2016)

Base Case Assumptions

- AVA-101 has a 50% chance of being successfully developed
- Should AVA-101 be successfully developed it will achieve $300MM in revenue by 2020 and over $4B at peak
- Avalanche's other pipeline programs contribute little shareholder value

Upside Scenario

- The probability of success of AVA-101's development is materially above 50%
- Should AVA-101 be successfully developed it will achieve more than $300MM in revenue by 2020 and more than $4B at peak
- Avalanche's other pipeline programs such as AVA-311, AVA-322 and AVA-323 are significant drivers of shareholder value

Downside Scenario

- AVA-101 is not successfully developed
- Even if successfully developed, AVA-101 captures little share of the wet AMD market
- Avalanche is unable to successfully develop any other pipeline programs

Price Performance

Source: Bloomberg

Company Description

Avalanche is a leader in the discovery and development of gene therapies for the eye. Avalanche has developed a directed evolution technology for the discovery of new AAV vectors that are engineered for specific cell types, allowing Avalanche to target retinal layers and deliver payloads for diseases such as wet age-related macular degeneration (AMD), juvenile x-linked retinoschisis, and macular telangiectasia. When Avalanche's AAV vectors are injected into the eye, they create long-term "Ocular BioFactories" that secrete therapeutic proteins over years. In addition to AVA-101, Regeneron has AVA-311, AVA-322 and AVA-323. AVA-311 is a one-time intravitreal injection for the treatment of juvenile X-linked retinoschisis (XLRS) which is currently in preclinical development and is partnered with Regeneron. AVA-322 and AVA-323 are for color blindness, and INDs for both candidates are expected to be filed during H2:2016.

Analyst Top Picks

	Ticker	Price (03/25/2015)	Price Target	Rating
BioMarin Pharmaceutical	BMRN	$115.62	$125.00	Outperform
Dynavax Technologies	DVAX	$23.76	$60.00	Outperform
Gilead Sciences	GILD	$99.86	$125.00	Outperform

Management And Expert Panel Discuss Areas Of Controversy.

AAVL hosted a panel of physician experts to discuss the treatment of wet AMD, and areas of controversy concerning AVA-101's development. The physician experts say that the high frequency of injections needed to maintain vision and the large amount of time spent in the doctor's office represent the highest burden to wet AMD patients and their caretakers. Often patients try to negotiate with physicians to use a less frequent injection schedule, but that infrequent dosing typically leads to suboptimal treatment and vision loss. In fact, the physicians think that the biggest risk to a wet AMD patient's vision is undertreatment with anti-VEGFs. Therefore, the physicians think that AVA-101 could represent a significant advance if it can control patients' disease for years following a single subretinal injection. The panel addressed several other topics of controversy among investors:

1) Adverse Events Due To Vitrectomy and Subretinal Injections: The rate of retinal detachments and infections associated with vitrectomy has been an area of debate among investors. Avalanche said that the rate of retinal detachments for small gauge vitrectomy (PPV) range between 0%-1.1%. As these estimates include patients with severe retinal conditions, patients being injected with AVA-101 should have detachments closer to the low end of the range. Moreover, the incidence of endophthalmitis (inflammation of the intraocular cavities caused by infection) is low (0.02%-0.05% in PPV procedures and 0.02%-0.09% in ITV procedures). Experts at the meeting view the procedure as easy, and say that any fellowship-trained retinal surgeon should be able to perform it. In the panel's experience, the rates of adverse events with this procedure are negligible, especially given the new surgical equipment. In fact, injecting AVA-101 subretinally is not viewed to be more risky than injection of TPA for subretinal hemorrhage, which has a good safety track record.

2) Could Vitrectomy Have Produced The Benefits Seen In Ph. I?: Some investors have questioned whether the vitrectomy procedure itself could have produced the improvements in visual acuity and the reduced need for VEGF injections seen in Ph. I. During today's meeting, data was presented in support of the fact that vitrectomy has no impact on the need for or outcome of anti-VEGF treatment.

3) Vector-Related Adverse Events: There have been no AAV2-related adverse events after seven years of experience with ~260 eyes injected.

4) Geographic atrophy: Data from the CATT study in support of the fact that anti-VEGF therapies do not appear to increase geographic atrophy will be presented at ARVO (May 2015). The physicians think that geographic atrophy is likely a result of the wet AMD disease process, rather than anti-VEGF therapy.

5) Reversal of Gene Therapy: The panelists think it unlikely that one would need to reverse anti-VEGF gene therapy in the eye. Nonetheless, if needed, the retinal cells expressing the protein can be laser ablated, reducing or eliminating the expression of the transgene.

Program In Color Blindness Unveiled.

In conjunction with the R&D day, Avalanche disclosed that it has struck an exclusive licensing deal with University of Washington where pioneering work on color vision deficiency (CVD, or color blindess) has been conducted. There are over 10 million individuals affected with CVD in the U.S. alone. The most common forms of CVD are due to genetic defects that lead to missing either the L-opsin (protan defect) or the M-opsin (deutan effect) photopigments.To target the cone photoreceptor cells where photopigments are found, Avalance also disclosed that it owns a proprietary vector engineered to effectively transduce these cells. The company has two candidates: AVA-322 which carries the gene for L-opsin (to treat protan defect) and AVA-323 which carries the gene for M-opsin (to treat deutan defect). Both candidates are being actively developed with the intention to file an IND in the second half of 2016.

Other cone-rod dystrophies such as Stargardt's disease could also be treated using such a vector capable of effectively transfecting cone photoreceptors.

Investment Thesis

Avalanche Biotech is a leader in the discovery and development of gene therapies for the eye. Avalanche has developed several adeno-associated virus (AAV) technologies which allow it to create new therapeutics that address unmet needs in ophthalmology. Avalanche has developed a directed evolution technology for the discovery of new AAV vectors that are engineered for specific cell types, allowing Avalanche to target retinal layers and deliver payloads for diseases such as wet age-related macular degeneration (AMD), juvenile x-linked retinoschisis, and macular telangiectasia. When Avalanche's AAV vectors are injected into the eye, they create long-term "Ocular BioFactories" that secrete therapeutic proteins over years following a single injection. Avalanche's lead product AVA-101 is completing a Phase IIa study in wet AMD, from which data are expected in mid-2015. AVA-101 is a subretinal injection of AAV that delivers the naturally occurring VEGF inhibitor sFlt-1 to the back of the eye. AVA-101 could be a functional cure for wet AMD. In a Phase I/II trial, subjects given AVA-101 gained vision with minimal need for additional treatments over a year. Wet AMD is a substantial market that we estimate was approximately $10B worldwide (at branded pricing) in 2014. Even minority share could garner AVA-101 multi-$B of sales. AVA-201 is a second generation sFLT-1 gene therapy that is being developed as an intravitreal injection. AVA-322 and AVA-323 are in development for the treatment of color blindness. '322 and '323 use a proprietary AAV vector which efficiently and specifically targets the cone cells of the retina. An IND is expected to be filed for both candidates during H2:2016. In May 2014 Avalanche signed a collaboration with Regeneron to discover and develop AAV-based gene therapies against up to eight other targets. Included in the partnership is AVA-311, a one-time intravitreal injection for the treatment of juvenile X-linked retinoschisis (XLRS), which is currently in preclinical development. Under the terms of the deal, Avalanche received $8MM up front and is eligible for up to $640MM in milestones. Avalanche has an option to share up to 35% of the profits and development costs for two targets and will receive tiered low- to mid-single-digit royalties on targets for which it does not opt in. Our DCF analysis suggests that Avalanche is undervalued based on the promise of AVA-101 alone, with no contribution from the rest of Avalanche's pipeline.

Avalanche Upcoming Milestones

Milestone	Timing
Release of data from AVA-101's Phase IIa	Mid:2015
Release of 36-month data from AVA-101's Phase I/II trial	H2:2015
Nomination of additional targets and candidates in Avalanche's collaboration with Regeneron	2015-16
Advancement of AVA-201 into clinical development for wet AMD	2016
Possible advancement of AVA-311 into clinical development for X-linked retinoschisis	2016
File IND for AVA-322 and AVA-323 in color blindness	H2:2016

Source: Cowen and Company

Avalanche Biotechnologies Quarterly P&L Model ($MM)

	Q1:14A	Q2:14A	Q3:14A	Q4:14A	2014A	Q1:15E	Q2:15E	Q3:15E	Q4:15E	2015E
AVA-101	-	-	-	-	-	-	-	-	-	-
License, Milestone and Grant Revenue	0.0	0.1	0.2	0.2	0.6	0.2	0.2	0.2	0.2	0.8
Total Revenue	0.0	0.1	0.2	0.2	0.6	0.2	0.2	0.2	0.2	0.8
COGS	-	-	-	-	-	-	-	-	-	-
R&D	0.9	3.1	5.7	7.2	17.0	6.0	6.2	6.4	6.5	25.1
SG&A	0.7	1.5	2.4	3.4	8.0	2.6	2.7	2.8	2.9	11.0
Other	-	-	-	-	-					-
Operating Expenses	1.6	4.6	8.1	10.6	25.0	8.6	8.9	9.2	9.4	36.1
Operating Income / (Loss)	(1.6)	(4.5)	(7.9)	(10.4)	(24.4)	(8.4)	(8.7)	(9.0)	(9.2)	(35.3)
Interest Income	-	0.1	-	0.0	0.1	-	-	-	-	-
Interest Expenses	(0.0)	(0.7)	-	-	(0.8)	-	-	-	-	-
Other Income (Expense)	(0.0)	(3.2)	(0.3)	-	(3.6)	-	-	-	-	-
Pretax net income	(1.7)	(8.324)	(8.3)	(10.4)	(28.6)	(8.4)	(8.7)	(9.0)	(9.2)	(35.3)
Taxes	-	-	-	-	-	-	-	-	-	-
Tax Rate	*0%*	*0%*	-	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
GAAP Net Income	(1.7)	(8.3)	(8.3)	(10.4)	(28.6)	(8.4)	(8.7)	(9.0)	(9.2)	(35.3)
GAAP EPS	**$ (0.45)**	**$ (2.27)**	**(0.5)**	**$ (0.46)**	**$ (2.47)**	**$ (0.34)**	**$ (0.35)**	**$ (0.36)**	**$ (0.36)**	**$ (1.40)**
Diluted Shares Outstanding (MM)	3.7	3.7	16.4	22.6	11.6	25.0	25.1	25.3	25.4	25.2

Source: Cowen and Company

Avalanche Biotechnologies Annual P&L Model ($MM)

	2014A	2015E	2016E	2017E	2018E	2019E	2020E
AVA-101	-	-	-	-	-	-	300.0
License, Milestone and Grant Revenue	0.6	0.8	-	-	-	-	-
Total Revenue	0.6	0.8	-	-	-	-	300.0
COGS	-	-	-	-	-	-	150.0
R&D	17.0	25.1	33.3	51.0	75.0	95.0	105.0
SG&A	8.0	11.0	15.0	25.0	75.0	150.0	175.0
Other	-	-	-	-	-	-	-
Operating Expenses	25.0	36.1	48.3	76.0	150.0	245.0	430.0
Operating Income / (Loss)	(24.4)	(35.3)	(48.3)	(76.0)	(150.0)	(245.0)	(130.0)
Interest Income	0.1	-	0.3	0.5	0.5	1.9	1.0
Interest Expenses	(0.8)	-	-	-	-	-	-
Other Income (Expense)	(3.6)	-	-	-	-	-	-
Pretax net income	(28.6)	(35.3)	(48.0)	(75.5)	(149.5)	(243.1)	(129.0)
Taxes	-	-	-	-	-	-	-
Tax Rate	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
GAAP Net Income	(28.6)	(35.3)	(48.0)	(75.5)	(149.5)	(243.1)	(129.0)
GAAP EPS	**$ (2.47)**	**$ (1.40)**	**$ (1.85)**	**$ (2.50)**	**$ (4.90)**	**$ (6.85)**	**$ (3.35)**
Diluted Shares Outstanding (MM)	11.6	25.2	25.9	30.2	30.5	35.5	38.5

Source: Cowen and Company

Avalanche Biotechnologies DCF Analysis

Financial Year End	12/31/2015
Valuation Date	3/25/2015
Discount Rate	**12.0%**
Terminal Growth Rate	**-10.0%**

Avalanche: DCF Valuation

$MM	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
AVA-101					0	300	1800	2700	3375	3713	3898	4093	4298	4513	4738	4738	711
Growth (%)							*500%*	*50%*	*25%*	*10%*	*5%*	*5%*	*5%*	*5%*	*5%*	*0%*	*-85%*
License, Milestone and Grant Revenue	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Growth (%)																	
Total Revenues	1	0	0	0	0	300	1800	2700	3375	3713	3898	4093	4298	4513	4738	4738	711
Growth (%)								*50%*	*25%*	*10%*	*5%*	*5%*	*5%*	*5%*	*5%*	*0%*	*-85%*
COGS	0	0	0	0	0	150	630	810	1,013	1,114	1,169	1,228	1,289	1,354	1,421	1,421	213
COGS as a % of sales						*50%*	*35%*	*30%*	*30%*	*30%*	*30%*	*30%*	*30%*	*30%*	*30%*	*30%*	*30%*
R&D	25	33	51	75	95	105	180	270	338	371	390	409	430	451	474	474	71
R&D as a % of Revenues						*35%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*
SG&A	11	15	25	75	150	175	360	540	675	743	780	819	860	903	948	948	142
SG&A as a % of Revenues						*58%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Operating Income	-35	-48	-76	-150	-245	-130	630	1080	1350	1485	1559	1637	1719	1805	1895	1895	284
Tax	0	0	0	0	0	0	221	378	473	520	546	573	602	632	663	663	100
Tax rate	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*35%*	*35%*	*35%*	*35%*	*35%*	*35%*	*35%*	*35%*	*35%*	*35%*	*35%*
NOL/Tax Assets Utilized																	
Tax rate																	
Taxes Paid	0	0	0	0	0	0	221	378	473	520	546	573	602	632	663	663	100
Approx Free Cash Flow	(35)	(48)	(76)	(150)	(245)	(130)	410	702	878	965	1,014	1,064	1,117	1,173	1,232	1,232	185
Years	0.76	1.77	2.77	3.77	4.76	5.77	6.77	7.77	8.76	9.77	10.77	11.77	12.76	13.77	14.77	15.77	16.76
Discount Factor	0.92	0.82	0.73	0.65	0.58	0.52	0.46	0.41	0.37	0.33	0.30	0.26	0.24	0.21	0.19	0.17	0.15
NPV of Cash flows	(32)	(39)	(56)	(98)	(143)	(68)	190	291	325	319	299	281	263	247	231	206	28

Terminal Value Calculation

Final year FCF	185
Perpetual Growth Rate	-10.0%
Terminal Value	**756**
Discount Factor	0.15
Present Value of Terminal Value	**113**
Present Value of Cash Flows	**2,244**
Enterprise Value	**2,357**
Add: Net cash	159
Market Value	**2,517**
Fully Diluted Shares Outstanding	22.6
Value per Fully Diluted Share	**$111.34**
Probability of success	50.0%
Value per Fully Diluted Share	**$55.67**

Source: Cowen and Company

Avalanche Biotechnologies's R&D Pipeline

Therapeutic Class/Product	Indication	P-C	I	II	III	FILING	MKT	Comments
Eye Diseases								
AVA-101	Wet AMD and DME			▪				Ph. II data expected in mid-2015
AVA-201	Wet AMD Prevention	▪						
AVA-311	XLRS	▪						Partnered program
AVA-322/AVA-323	Color Blindness	▪						IND filing expected H2:2016
Total Drugs In Development		**3**	**0**	**0**	**1**	**0**	**0**	
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Source: Cowen and Company

Valuation Methodology And Risks

Valuation Methodology

Biotechnology:

In calculating our 12-month target price, we employ one or more valuation methodologies, which include a discounted earnings analysis, discounted cash flow analysis, net present value analysis and/or a comparable company analysis. These analyses may or may not require the use of objective measures such as price-to-earnings or price-to-sales multiples as well as subjective measures such as discount rates.

We make investment recommendations on early stage (pre-commercial) biotechnology companies based upon an assessment of their technology, the probability of pipeline success, and the potential market opportunity in the event of success. However, because these companies lack traditional financial metrics, we do not believe there are any good methodologies for assigning a specific target price to such stocks.

Investment Risks

Biotechnology:

There are multiple risks that are inherent with an investment in the biotechnology sector. Beyond systemic risk, there is also clinical, regulatory, and commercial risk. Additionally, biotechnology companies require significant amounts of capital in order to develop their clinical programs. The capital-raising environment is always changing and there is risk that necessary capital to complete development may not be readily available.

Risks To The Price Target

The majority of Avalanche's market capitalization is dependent upon the success of lead candidate AVA-101. AVA-101's value could be adversely impacted should its clinical trials fail, should the regulatory agencies deny approval, or should its commercial opportunity not materialize as we project. In fact, all of Avalanche's drug candidates face clinical and regulatory risk. With the future development path depending on the evolution of clinical data, revenue forecasts are uncertain. The commercial outlook for Avalanche's candidates could additionally be altered by safety/efficacy findings, emerging competition, alterations in the medical treatment paradigm, or changes in the pricing environment. Some of Avalanche's projected market exclusivity depends on patents, which are subject to challenge by potential competitors.

Addendum

Stocks Mentioned In Important Disclosures

Ticker	Company Name
AAVL	Avalanche Biotechnologies
BMRN	BioMarin Pharmaceutical
DVAX	Dynavax Technologies
GILD	Gilead Sciences

Analyst Certification

Each author of this research report hereby certifies that (i) the views expressed in the research report accurately reflect his or her personal views about any and all of the subject securities or issuers, and (ii) no part of his or her compensation was, is, or will be related, directly or indirectly, to the specific recommendations or views expressed in this report.

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Cowen and Company, LLC and or its affiliates make a market in the stock of Avalanche Biotechnologies, BioMarin Pharmaceutical, Dynavax Technologies and Gilead Sciences securities.

Cowen and Company, LLC and/or its affiliates beneficially own 1% or more of the common equity securities of Avalanche Biotechnologies .

Avalanche Biotechnologies and Dynavax Technologies have been client(s) of Cowen and Company, LLC in the past 12 months.

Cowen and Company, LLC and/or its affiliates expect to receive, or intend to seek, compensation for investment banking services in the next 3 months from Avalanche Biotechnologies and Dynavax Technologies.

Avalanche Biotechnologies and Dynavax Technologies is or was in the past 12 months a client of Cowen and Company, LLC; during the past 12 months, Cowen and Company, LLC provided IB services.

Cowen and Company, LLC and/or its affiliates received in the past 12 months compensation for investment banking services from Avalanche Biotechnologies and Dynavax Technologies.

Cowen and Company, LLC and/or its affiliates managed or co-managed a public offering of Avalanche Biotechnologies and Dynavax Technologies within the past twelve months.

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COWEN AND COMPANY RATING DEFINITIONS

Cowen and Company Rating System effective May 25, 2013

Outperform (1): The stock is expected to achieve a total positive return of at least 15% over the next 12 months

Market Perform (2): The stock is expected to have a total return that falls between the parameters of an Outperform and Underperform over the next 12 months

Underperform (3): Stock is expected to achieve a total negative return of at least 10% over the next 12 months

Assumption: The expected total return calculation includes anticipated dividend yield

Cowen and Company Rating System until May 25, 2013

Outperform (1): Stock expected to outperform the S&P 500

Neutral (2): Stock expected to perform in line with the S&P 500

Underperform (3): Stock expected to underperform the S&P 500

Assumptions: Time horizon is 12 months; S&P 500 is flat over forecast period

Cowen Securities, formerly known as Dahlman Rose & Company, Rating System until May 25, 2013

Buy – The fundamentals/valuations of the subject company are improving and the investment return is expected to be 5 to 15 percentage points higher than the general market return

Sell – The fundamentals/valuations of the subject company are deteriorating and the investment return is expected to be 5 to 15 percentage points lower than the general market return

Hold – The fundamentals/valuations of the subject company are neither improving nor deteriorating and the investment return is expected to be in line with the general market return

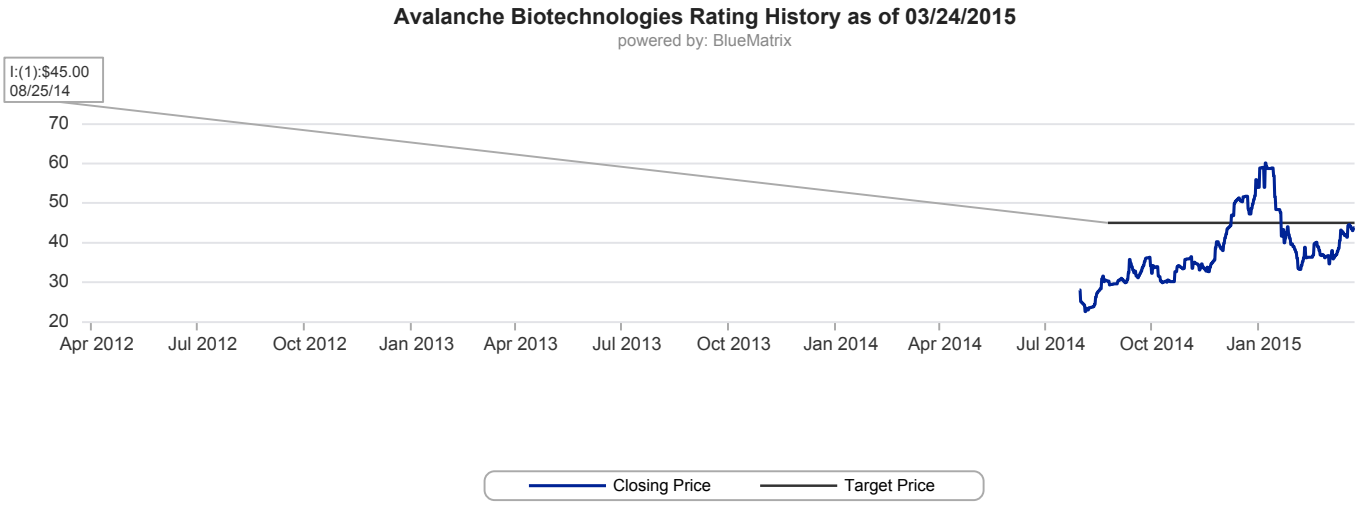
Cowen And Company Rating Definitions

Distribution of Ratings/Investment Banking Services (IB) as of 12/31/14

Rating	Count	Ratings Distribution	Count	IB Services/Past 12 Months
Buy (a)	461	60.50%	109	23.64%
Hold (b)	288	37.80%	14	4.86%
Sell (c)	13	1.71%	0	0.00%

(a) Corresponds to "Outperform" rated stocks as defined in Cowen and Company, LLC's rating definitions. (b) Corresponds to "Market Perform" as defined in Cowen and Company, LLC's ratings definitions. (c) Corresponds to "Underperform" as defined in Cowen and Company, LLC's ratings definitions.

Note: "Buy", "Hold" and "Sell" are not terms that Cowen and Company, LLC uses in its ratings system and should not be construed as investment options. Rather, these ratings terms are used illustratively to comply with FINRA and NYSE regulations.



BioMarin Pharmaceutical Rating History as of 03/24/2015

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Dynavax Technologies Rating History as of 03/24/2015

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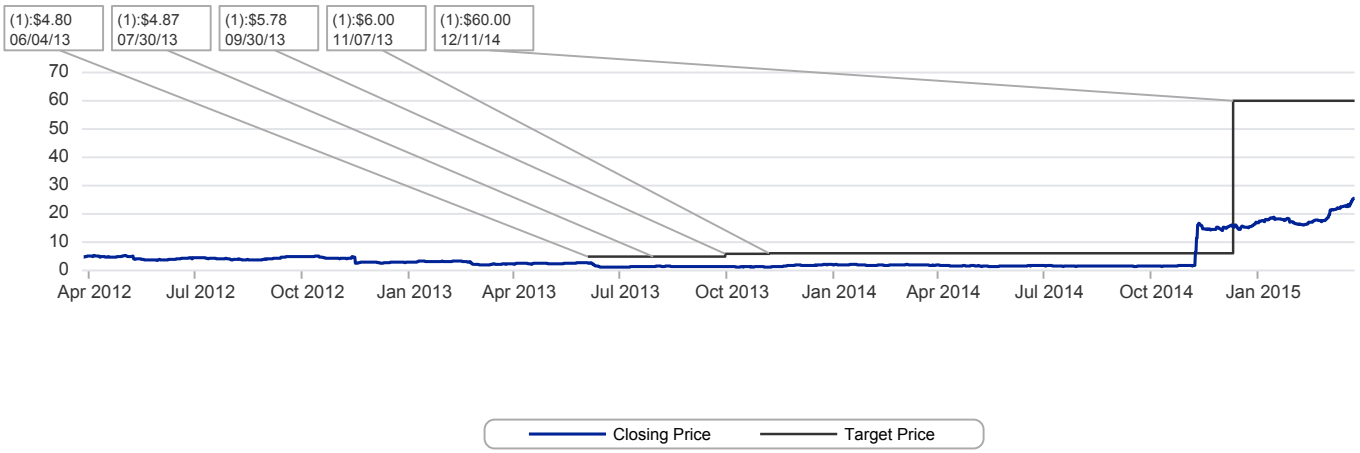

Gilead Sciences Rating History as of 03/24/2015

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Legend for Price Chart:

I = Initiation | 1 = Outperform | 2 = Market Perform | 3 = Underperform | UR = Price Target Under Review | T = Terminated Coverage | $xx = Price Target | NA = Not Available | S=Suspended

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