COWEN
AND COMPANY

Biotechnology

Genocea Biosciences

Equity Research

Earnings Update

February 12, 2015

Price: $9.00 (02/12/2015)
Price Target: $40.00

OUTPERFORM (1)

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Key Data

Symbol	NASDAQ: GNCA
52-Week Range:	$23.99 - 6.15
Market Cap (MM):	$158.5
Net Debt (MM):	$(35.6)
Cash/Share:	$2.67
Dil. Shares Out (MM):	17.6
Enterprise Value (MM):	$122.9
ROIC:	NA
ROE (LTM):	NA
BV/Share:	$0.02
Dividend:	NA

FY (Dec)	2014A	2015E	2016E
Earnings Per Share			
Q1	$(0.76)	$(0.67)	-
Prior Q1	-	*$(0.49)*	-
Q2	$(0.41)	$(0.63)	-
Prior Q2	-	*$(0.45)*	-
Q3	$(0.53)	$(0.64)	-
Prior Q3	-	*$(0.51)*	-
Q4	$(0.66)	$(0.66)	-
Prior Q4	*$(0.54)*	*$(0.59)*	-
Year	$(2.28)	$(2.60)	$(2.30)
Prior Year	*$(2.14)*	*$(2.05)*	*$(1.70)*
P/E	NM	NM	NM
Consensus EPS	-	-	-

Consensus source: Thomson Reuters

Revenue (MM)			
Year	$0.3	$0.0	$0.0
Prior Year	*$0.0*	-	-
EV/S	409.7x	-	-

Reports Q4; GEN-003's Dose Optimization Data On Track For Q2

The Cowen Insight

Genocea reported a Q4:14 net loss of $11.7MM and ended 2014 with a cash balance of $47.1MM. Top-line Phase II data from GEN-003's HSV-2 dose optimization trial is on track for Q2:15. GEN-004's Phase II trial continues to enroll and data is now expected in Q4:15. We remain at Outperform.

Financial Update:

Genocea reported a Q4:14 net loss of $11.7MM and ended 2014 with $47.1MM in cash. Management expects its cash balance and $5MM available on a loan facility to be sufficient to fund operations into Q1:16.

GEN-003 Dose Optimization Data In Q2:15; Goal Is Pan-HSV Coverage

GEN-003's (therapeutic HSV vaccine) PI/II trial produced a 48% reduction in genital lesions and 52% reduction in HSV-2 shedding using 30mg of antigen and 60mg of adjuvant. Our consultants believe these data are impressive, and would make GEN-003 commercially viable if repeated in Phase III. Nonetheless, Genocea is conducting a PII dose optimization trial in the hopes of further improving GEN-003's profile. The dose optimization trial is testing 30mg or 60mg of antigen with 25mg, 50mg, or 75mg of adjuvant. The trial completed enrollment in January 2015 and data from the initial 28-day post-vaccination period is expected in late Q2:15. Management notes that results from GEN-003's PI/II trial and other programs demonstrate that post-dose data is highly predictive of effects at later time points. Therefore, the late Q2 data will be used to select a dose to bring forward. The next trial will be a "dose regimen" trial testing the number and frequency of doses required to generate the optimal response.

GEN-003's antigens are conserved across both HSV-1 and HSV-2. At April's ECCMID meeting, Genocea will present data on GEN-003's ability to stimulate an anti-HSV-1 immune response. Genocea hopes to pursue a GEN-003 BLA that includes coverage of all genital herpes infections, not just HSV-2. The exact path to such a label will be established in future meetings with the FDA. HSV-1 infected patients are not included in our model and would represent upside to our ests.

GEN-004 Proof Of Concept Data In Q4:15

Current B cell targeting pneumococcal vaccines cover 13-23 serotypes but over 90 exist. GEN-004 is a pneumococcal vaccine candidate that seeks to stimulate T_H17 cells and provide universal pneumococcal protection. Phase I data indicates that GEN-004 is immunogenic. Genocea is currently enrolling a placebo controlled Phase IIa nasal challenge trial testing for the frequency, magnitude, and duration of pneumococcus colonization. Top-line results are now anticipated to be released in Q4:15 (prior mid-2015). Management believes a statistically significant impact on any of the three colonization parameters will provide proof of concept warranting further development.

At A Glance

Our Investment Thesis

Genocea Biosciences is a clinical stage company developing sophisticated, high value vaccines and in particular is a leader in the discovery and development of T-cell vaccines. Genocea has four visible programs, including two in clinical development. GEN-003 is a therapeutic vaccine for HSV, the cause of genital herpes. GEN-003 has produced strong proof-of-concept Phase II HSV-2 data that our consultants have called "impressive". We estimate a safe and effective HSV-2 therapeutic vaccine would have $1B+ sales potential. Genocea has also advanced a pneumococcal vaccine into early clinical development. Our analysis suggests that Genocea is undervalued just on GEN-003's potential in HSV-2, with no other contribution from HSV-1, Genocea's other programs or value attributed to the ATLAS platform. We expect Genocea to outperform the market over the next 12 – 24 months as GEN-003 and GEN-004 progress through development.

Forthcoming Catalysts

- Data from GEN-003's Phase II dose titration trial (Q2:15)
- Data from GEN-004's Phase II challenge trial (Q4:15)

Base Case Assumptions

- GEN-003 is successfully developed and generates $750MM in revenue by 2025
- GEN-004 progresses through development but does not generate substantial revenue before 2020
- Genocea's other vaccine candidates do not create significant shareholder value before 2020

Upside Scenario

- GEN-003 is successfully developed and generates more than $750MM in revenue by 2025
- GEN-004 progresses through development and drives significant shareholder value
- Genocea's other vaccine candidates look promising and are attributed much value

Downside Scenario

- GEN-003 is not successfully developed and/or generates less than $750MM in revenue by 2025
- GEN-004 does not progress
- Genocea's other vaccine candidates do not create significant shareholder value before 2020
- Genocea's ATLAS technology fails to generate new candidates or partnerships

Price Performance

Source: Bloomberg

Company Description

Genocea's key advantages in the competitive field of vaccine discovery and development are novel and proprietary technologies to identify and validate vaccine antigens that generate a strong cellular (T Cell derived) immune response against pathogens that are resistant to conventional antibody-eliciting vaccines. Genocea has optimized its ATLAS platform in order to screen more exhaustively than others for epitopes that initiate CD4 (helper T Cells) and CD8 (cytotoxic T Cells). Genocea has four visible programs, including two in clinical development. GEN-003 is a therapeutic vaccine for HSV, the cause of genital herpes. GEN-004 is a pneumococcal vaccine in early clinical development. Genocea also has research programs in Chlamydial vaccines and malarial vaccines.

Analyst Top Picks

	Ticker	Price (02/12/2015)	Price Target	Rating
BioMarin Pharmaceutical	BMRN	$98.78	$115.00	Outperform
Gilead Sciences	GILD	$100.80	$125.00	Outperform
Portola Pharmaceuticals	PTLA	$31.83	$45.00	Outperform

Investment Thesis

Genocea Biosciences is a clinical stage company developing sophisticated, high value vaccines, and in particular is a leader in the discovery and development of T cell vaccines. Genocea's key advantages in this complex area of drug development are novel and proprietary technologies to identify and validate vaccine antigens that generate a strong cellular (T cell derived) immune responses against pathogens that are resistant to conventional antibody-eliciting vaccines. The company and its founders have a nearly 20-year history of identifying T cell antigens in novel ways. This experience has allowed Genocea to optimize its ATLAS platform in order to screen more rapidly and exhaustively than others for epitopes that initiate CD4 (helper T cells) and/or CD8 (cytotoxic T cells) T cell responses. ATLAS is a high throughput approach to antigen identification that allows T cells from many different patients to be screened and compared to identify not only antigens, but protective antigens. ATLAS also allows Genocea to exploit new advances in immunology - such as rapidly screening for T_H17 antigens quickly after it was discovered that these newly characterized T cells were a key part of a protective response against pneumococcal disease. Genocea has four visible programs, including two in clinical development. GEN-003 is a therapeutic vaccine for herpes simplex virus (HSV), the cause of genital herpes. GEN-003 has produced strong proof-of-concept Phase II data in HSV-2 that our consultants have called "impressive." We estimate a safe and effective HSV-2 therapeutic vaccine would have $1B+ sales potential. Genocea has also advanced a pneumococcal vaccine into early clinical development. In addition, the company has research programs in chlamydial and malarial vaccines. We expect the company to keep collaborating with academic and foundation scientists who wish to apply Genocea's powerful ATLAS technology to new problems in vaccine development. Our analysis suggests that Genocea is undervalued just on GEN-003's potential in HSV-2, with no other contribution from HSV-1, Genocea's other programs, or value attributed to the ATLAS platform. We expect Genocea to outperform the market over the next 12–24 months as GEN-003 and GEN-004 progress through development.

Genocea - Upcoming Milestones/Events

Indication/Milestone	Timing
Present data on GEN-003's anti-HSV-1 properties at ECCMID	April 22-26, 2015
Initial data from post dose 3 analysis in GEN-003's Phase II dose titration trial	Q2:15
Data from GEN-004's Phase II challenge trial	Q4:15
Initiation of GEN-003's Phase II dose regimen trial	H2:15
Updates on preclinical malaria, chlymdia, and/or prophylactic herpes vaccines	2015
6 month post-dose 3 data from GEN-003's Phase II dose titration trial	Q1:16

Source: Cowen and Company

Genocea Quarterly P&L

	Q1:14A	Q2:14A	Q3:14A	Q4:14A	2014A	Q1:15E	Q2:15E	Q3:15E	Q4:15E	2015E
GEN-003	-	-	-	-	-	-	-	-	-	-
GEN-004	-	-	-	-	-	-	-	-	-	-
Contract, Grant Revenue And Other				0.3	0.3					
Total Revenue	-	-	-	0.3	0.3	-	-	-	-	-
COGS	-	-	-	-	-	-	-	-	-	-
Gross Margin										
R&D	4.4	4.6	6.1	8.7	23.7	8.8	8.9	9.2	9.5	36.4
SG&A	2.0	2.4	2.8	2.6	9.7	2.6	2.7	2.8	2.9	11.0
Other										
Operating Expenses	6.4	6.9	9.0	11.2	33.5	11.4	11.6	12.0	12.4	47.4
Operating Income / (Loss)	(6.4)	(6.9)	(9.0)	(10.9)	(33.2)	(11.4)	(11.6)	(12.0)	(12.4)	(47.4)
Interest Income, net	-	(0.2)	-	(0.7)	(1.0)	(0.7)	(0.7)	(0.7)	(0.7)	(2.8)
Other Income	(1.0)	-	(0.2)	-	(1.2)					
Pretax net income	(7.3)	(7.1)	(9.2)	(11.7)	(35.3)	(12.1)	(12.3)	(12.7)	(13.1)	(50.2)
Accretion of redeemable convertible preferred stock	(0.2)	-	-	-	(0.2)					
Taxes	-	-	-	-	-	-	-	-	-	-
Tax Rate	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
GAAP Net Income	(7.5)	(7.1)	(9.2)	(11.7)	(35.5)	(12.1)	(12.3)	(12.7)	(13.1)	(50.2)
GAAP EPS	**$ (0.76)**	**$ (0.41)**	**$ (0.53)**	**$ (0.66)**	**$ (2.28)**	**$ (0.67)**	**$ (0.63)**	**$ (0.64)**	**$ (0.66)**	**$ (2.60)**
Diluted Shares Outstanding (MM)	9.9	17.3	17.5	17.7	15.6	18.0	19.6	19.7	19.9	19.3

Source: Cowen and Company

Genocea Annual P&L

	2014A	2015E	2016E	2017E	2018E	2019E	2020E
GEN-003	-	-	-	-	-	-	15.0
GEN-004	-	-	-	-	-	-	-
Contract, Grant Revenue And Other	0.3	-	-	-	-	-	-
Total Revenue	0.3	-	-	-	-	-	15.0
COGS	-	-	-	-	-	-	1.5
Gross Margin	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*90%*
R&D	23.7	36.4	45.3	55.0	65.5	75.8	85.3
SG&A	9.7	11.0	12.0	15.0	25.0	50.0	115.0
Other	-	-	-	-	-	-	-
Operating Expenses	33.5	47.4	57.3	70.0	90.5	125.8	201.8
Operating Income / (Loss)	(33.2)	(47.4)	(57.3)	(70.0)	(90.5)	(125.8)	(186.8)
Interest Income, net	(1.0)	(2.8)	(1.0)	-	2.0	6.0	8.0
Other Income							
Pretax net income	(35.3)	(50.2)	(58.3)	(70.0)	(88.5)	(119.8)	(178.8)
Accretion of redeemable convertible preferred stock	(0.2)	-	-	-	-	-	-
Taxes	-	-	-	-	-	-	-
Tax Rate	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
GAAP Net Income	(35.5)	(50.2)	(58.3)	(70.0)	(88.5)	(119.8)	(178.8)
GAAP EPS	**(2.28)**	**(2.60)**	**(2.30)**	**(2.75)**	**(3.40)**	**(3.40)**	**(4.35)**
Diluted Shares Outstanding (MM)	15.6	19.3	25.3	25.5	26.0	35.2	41.1

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

Much of Genocea's valuation rests on the value of its ATLAS vaccine discovery technology platform, and the revenue potential of its pipeline programs. Determining the value of a technology platform is difficult. Many factors could alter the value, including competition from newer technology platforms, the success or failure of Genocea's candidate vaccines, and the attractiveness of vaccine development more generally. Projecting future sales for any product is difficult, and this is particularly the case for candidates that have yet to be approved. Genocea's stock could be impacted by changes in the regulatory, commercial, or competitive environment for its candidate vaccines or for vaccines more generally. Moreover, the market exclusivity of Genocea's vaccines is largely dependent on their patents, which could be subject to challenge.

Addendum

Stocks Mentioned In Important Disclosures

Ticker	Company Name
BMRN	BioMarin Pharmaceutical
GNCA	Genocea Biosciences
GILD	Gilead Sciences
PTLA	Portola Pharmaceuticals

Analyst Certification

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Portola Pharmaceuticals has been client(s) of Cowen and Company, LLC in the past 12 months.

Portola Pharmaceuticals 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.

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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

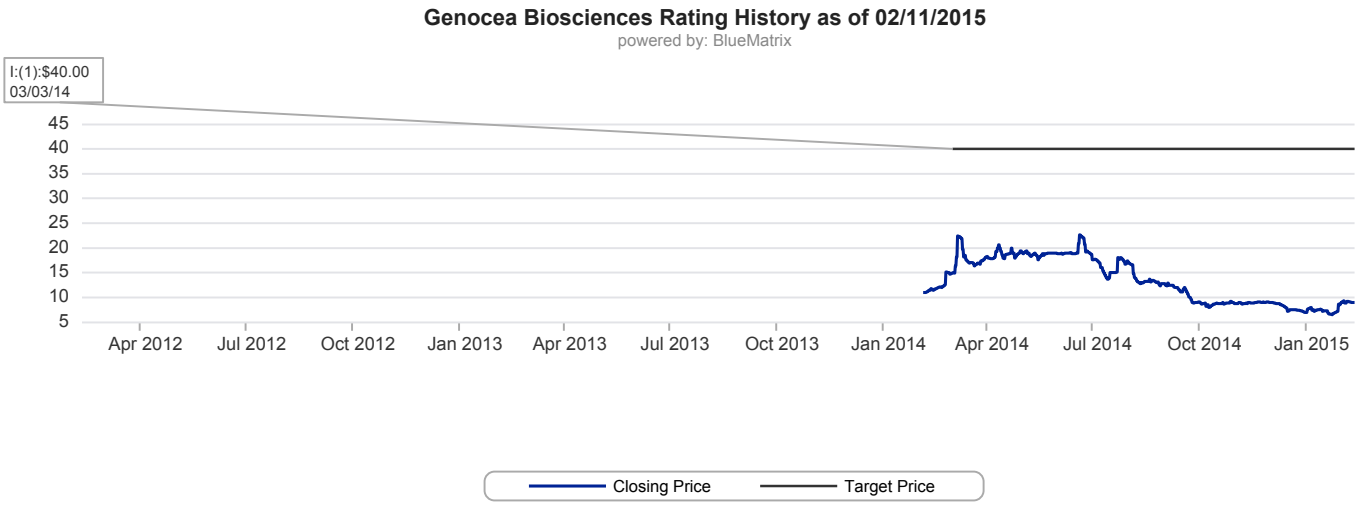
Cowen And Company Rating Definitions

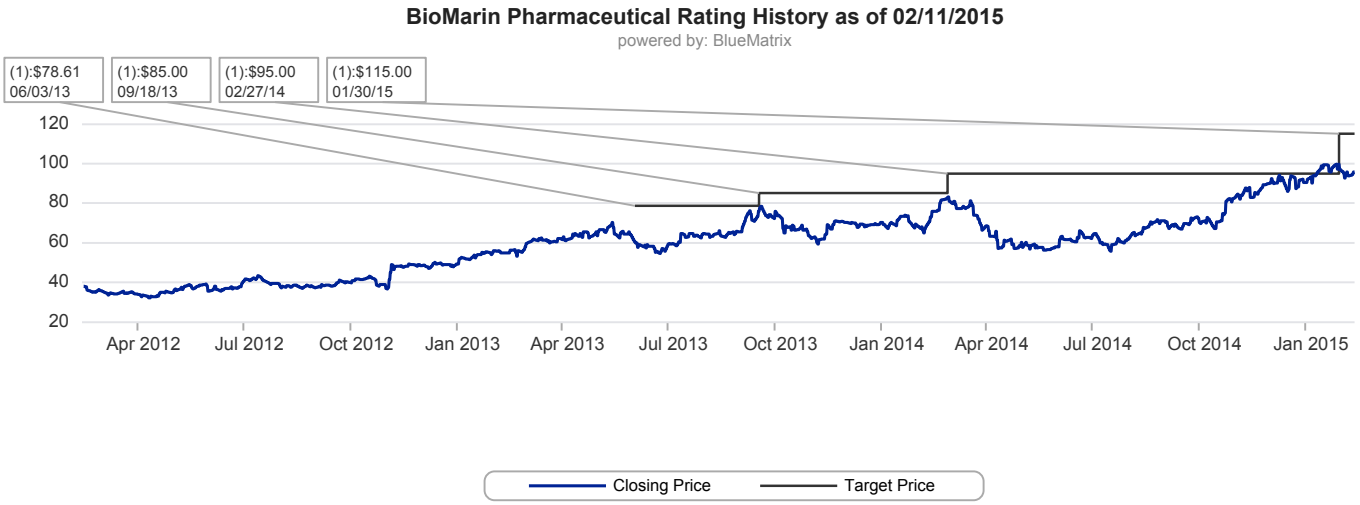
Distribution of Ratings/Investment Banking Services (IB) as of 12/31/14

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.





Gilead Sciences Rating History as of 02/11/2015

powered by: BlueMatrix

Portola Pharmaceuticals Rating History as of 02/11/2015

powered by: BlueMatrix

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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