



Biotechnology Stock Trading Survey, 2014

Biotechnology companies, especially those that concentrate on developing therapeutic candidates, tend to experience large moves in value associated with the progress of their clinical programs. An individual therapeutic candidate can promise billions in potential sales, while the likelihood of making it from pre-clinical stages to full marketing approval by the FDA can be de minimis. Every success or failure on this path can lead to significant changes in value.

Weekly Simple Return Stats

Median	=	0.1%
SD	=	10.1%
Skewness	=	2.0
Kurtosis	=	20.1

Big valuation shifts present challenges in assess the attractiveness of development stage biopharmaceutical products. While probabilities of clinical success are well documented, forward-looking estimates are still highly subjective. For many valuation methods to work property, the subject company value needs to grow smoothly, without substantial jumps. Quantitative methods such as binomial or Monte Carlo simulation are flexible enough to incorporate binary outcomes of individual clinical programs, but require assumptions related to how much an individual stock can go up or down in response to clinical progress.

We found that the magnitude of stock price moves is hard to predict. Stock prices depend on such drivers as active pipeline, back-up candidates, platform technology, revenue streams, and collaborative agreements. Publicly traded stocks can move in anticipation of certain events or be limited as to how much investors are willing to pay for “good news.”

The Method

We studied how much biotech stock prices can move in response to news about their pipelines. Our survey included 88 companies with \$5.0 Bn market capitalization or less. 21 months of trading history was analyzed on a weekly basis. Top data points were studied to understand the reasons for changes in stock prices. We relied on publicly available information only and excluded those data points where no public information was available to identify the event that moved the stock.

Observations

General Statistics		
Companies	=	88
Market Cap	<	\$5 Bn
Months of Trading	=	21
Frequency	=	Weekly
Move Above 50%	=	29
Move Below -50%	=	9

- Most stock prices moved due to underlying clinical development events or corporate transactions.
- We found 29 instances of weekly stock prices rising 50% or more, and 2 instances above 100% threshold.
- Because our weekly observations did not always capture the full magnitude of stock movement, we examined the 20 highest performing weeks and identified 5 instances where the stock price moved up more than 100% in reaction to positive news. 181% was the largest such increase.
- We found 9 instances of weekly stock prices dropping 50% or more. 77% was the largest loss observed.
- Most of the up-moves were due to positive news related to Phase 1 and Phase 2 stages of clinical development.
- A greater proportion of down-moves were due to Phase 3 failures.
- Our analysis excluded a number of significant Phase 3 up-moves due to the \$5 Bn limitation on the market capitalization of the companies included in the analysis.

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Up Movers (Top 10)		Percentage		Event Date	Related To	Details	
Ticker Symbol	Move	Event Move	Move				
1	Achillion Pharmaceuticals, Inc.	ACHN	84%	181%	6/10/2014	Phase 1	Initiation of ACH-3422 Dosing in HCV-Infected Patients and Ability to Resume Sovaprevir Clinical Program for the Treatment of Chronic HCV.
2	Keryx Biopharmaceuticals	KERX	80%	144%	1/28/2013	Phase 1	Zerenex™ (ferric citrate) Meets Primary and All Key Secondary Endpoints in Phase 3 Study for Hyperphosphatemia in End-Stage Renal Disease Patients on Dialysis.
3	Osiris Therapeutics, Inc.	OSIR	88%	111%	8/13/2013	Phase 3	Grafix® Demonstrates Overwhelming Efficacy in Landmark Stem Cell Study for the Treatment of Diabetic Foot Ulcers
4	Oncomed Pharmaceuticals Inc	OMED	81%	106%	12/2/2013	Collaboration	Entered into an Agreement with Celgene to collaborate on novel anti-CSC biologic therapeutics, and on novel anti-CSC small molecule therapeutics.
5	Clovis Oncology, Inc.	CLVS	114%	102%	6/3/2013	Phase 2	Rucaparib Demonstrates Encouraging Results from Ongoing Phase I/II Monotherapy Study in Patients with Solid Tumors.
6	Endocyte, Inc.	ECYT	96%	92%	3/21/2014	Phase 2	Phase 2b TARGET Trial Evaluating Vintafolide/Docetaxel Combination in Non-Small Cell Lung Cancer (NSCLC) Met Primary Endpoint of Improved Progression Free Survival.
7	Conatus Pharmaceuticals Inc.	CNAT	93%	89%	1/13/2014	Phase 2	Plans to initiate Phase 2b clinical trial in 2H 2014 evaluating its lead drug candidate emricasan in Post Orthotopic Liver Transplant recipients.
8	Avanir Pharmaceuticals, Inc.	AVNR	105%	85%	9/15/2014	Phase 2	Positive Phase II Trial Results for AVP-923 in Treatment of Agitation in Patients with Alzheimer's Disease.
9	BioCryst Pharmaceuticals, Inc.	BCRX	90%	84%	7/22/2013	Phase 1	Completes Phase 1 Clinical Trial of BCX4161 for the Treatment of Hereditary Angioedema.
10	Ariad Pharmaceuticals Inc.	ARIA	97%	76%	11/22/2013	Market	Positive Opinion by the EMA on the Continued Availability of Iclusig in Patients with Leukaemias.

Down Movers (Top 10)		Percentage		Event Date	Related To	Details
Ticker Symbol	Move	Event Move	Move			
1	Ariad Pharmaceuticals Inc.	ARIA	-77%	10/9/2013	Phase 3	ARIAD Announces Changes in the Clinical Development Program of Iclusig.
2	Endocyte, Inc.	ECYT	-61%	5/2/2014	Phase 3	Independent DSMB Recommends Vintafolide Proceed Phase 3 Trial Be Stopped For Futility Following Interim Analysis.
3	Geron Corporation	GERN	-61%	3/12/2014	Phase 1	IND Clinical Hold Affecting Clinical Trials of Imetelstat in Essential Thrombocythemia and Multiple Myeloma.
4	Sarepta Therapeutics Inc	SRPT	-60%	11/12/2013	Phase 1	Update on its discussions with FDA regarding its planned NDA and confirmatory clinical study with eteplirsen for the treatment of Duchenne muscular dystrophy.
5	Achillion Pharmaceuticals, Inc.	ACHN	-59%	9/30/2013	Phase 2	FDA concluded that the removal of the clinical hold on hepatitis C drug sovaloprevir after elevations in liver enzymes is not warranted.
6	Cytokinetics, Inc	CYTK	-59%	4/25/2014	Phase 2	BENEFIT-ALS did not achieve its primary efficacy endpoint.
7	Exelixis, Inc.	EXEL	-55%	9/2/2014	Phase 3	Phase 3 pivotal trial of cabozantinib in men with metastatic castration-resistant prostate cancer did not meet its primary endpoint.
8	Amarin Corporation plc	AMRN	-54%	10/16/2013	Phase 1	FDA rejected Vascepa® as an adjunct to diet and exercise and in combination with a statin in the treatment of mixed dyslipidemia and coronary heart disease.
9	Synthetic Biologics Inc.	SYN	-51%	4/30/2014	Phase 2	Synthetic Biologics to Discuss Phase II Results of Oral Estriol Candidate Trimesta™ for Relapsing-Remitting Multiple Sclerosis in Women.
10	Epizyme, Inc.	EPZM	-44%	11/14/2013	Phase 1	Announced initial findings from an ongoing Phase 1 study of EPZ-5676 for treatment of AL with alterations in the MLL gene.



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