JMP

Calithera Biosciences, Inc. (CALA)

CALA Pipeline Candidates Featured at AACR-NCI-EORTC Conference

MARKET DATA

Price	$7.42
52-Week Range:	$4.31 - $33.48
Shares Out. (M):	17.6
Market Cap ($M):	$130.6
Average Daily Vol. (000):	167.0
Cash (M):	$88
Cash/Share:	$4.91
Enterprise Value (M):	$27
Float (M):	17.7
LT Debt (M):	$0

Source: Thomson Reuters and JMP Securities LLC

FY DEC		2014A	2015E	2016E
Revenue ($M)	1Q	$0.0	$0.0A	--
	2Q	$0.0	$0.0A	--
	3Q	$0.0	$0.0	--
	4Q	$0.0	$0.0	--
	FY	**$0.0**	**$0.0**	**$0.0**
EPS	1Q	--	($0.40)A	--
	2Q	($1.22)	($0.42)A	--
	3Q	($0.29)	($0.50)	--
	4Q	($0.37)	($0.52)	--
	FY	**($1.47)**	**($1.86)**	**($3.63)**
	P/E	NM	NM	NM

Source: Company reports and JMP Securities LLC

STOCK PRICE PERFORMANCE

MARKET OUTPERFORM | Price: $7.42 | Target Price: $20.00

INVESTMENT HIGHLIGHTS

Calithera Biosciences to present data from both its glutaminase and arginase inhibitor programs at the "Triple Meeting"; reiterate our Market Outperform rating and $20 price target based on a synthesis of DCF, SOTP, and comparable valuation methodologies. In an incremental update of its ongoing Phase I trial, Abstract C49 highlights the study evaluating CALA's glutaminase inhibitor CB-839, given in 21-day cycles, in patients with advanced and/or refractory solid tumors. Safety data were collected from 85 patients from a total of 93 patients enrolled as of July 24 2015 (up from the 76 described at ASCO). The total updated 93 patients comprised of the 32 patients on a three times daily dosing schedule (100-800mg TID), who were described previously, and 61 patients on a twice-daily fed schedule (600-1000mg BID), up from the 27 patients described earlier. In our view, although the data are positive given the low rate of adverse events and rates of clinical activity, we are particularly interested in the update on patients harboring TCA cycle mutations enrolled in the study. The 27th EORTC-NCI-AACR ("Triple Meeting") Symposium will be held on Nov. 5-9 in Boston.

Arginase inhibitor preclinical data to make its debut. The restoration of arginine levels, which is often found depleted in tumors, by antagonizing the immunosuppressive activity of myeloid derived tumor cells (MDSCs) enables T-cell activation and proliferation in order for the T-cell to mount an anti-tumor response. Abstract A195 describes the isolation of a potent and selective arginase inhibitor, CB-1158 with an IC_{50} of less than 100nM in a cell assay. In the cell types tested, inhibition of the enzyme arginase did not have any effect on proliferation. However, in peripheral blood mononuclear cells (PBMCs) derived from a patient with renal cell carcinoma containing both suppressive MDSCs and cytotoxic T cells, the addition of an arginase inhibitor produced a dose-dependent increase in T cell proliferation over vehicle controls. According to the abstract, CB-1158 compound appears to have high oral bioavailability in mice and rats. Of significance, treatment with the agent in mice bearing lung tumors resulted in a 3-4 fold increase in tumor arginine levels. In a different mouse model, dosing with single agent CB-1158 demonstrated anti-tumor activity, with concomitant increase in systemic plasma arginine. Evaluation of the tumors treated with CB-1158 revealed an increase in CD3+ T-cell infiltrates, consistent with an immune-based mechanism of the agent. Importantly, CB-1158 had no impact on rodent body weight or serum chemistry enzymes. We look forward to reviewing the data in greater detail at the meeting.

Michael G. King, Jr.
mking@jmpsecurities.com
(212) 906-3520

CB-839 demonstrating single-agent clinical activity in the Phase I trial. Stable disease was defined as being on the study and having a median of >5 cycles (range of 3-18) of treatment. According to the abstract, 15 (65%) patients remain on the study. Radiographic stable disease (SD) was observed in the 19% (6/31 response-evaluable patients) on the TID schedule and a remarkable 40% (17/43 response-evaluable) on the BID schedule. Of note, at ASCO, 41% was reported on the BID schedule in seven patients out of 17 response-evaluable, while 19% (6/31) was also reported in the TID schedule. These SD patients included 64% (6/11) RCC patients (up from one previously reported) on the BID schedule, five of whom remain on study. Further, a TNBC patient has maintained SD for more than a year and has demonstrated a 23% reduction in tumor burden. At ASCO, two TNBC patients had been reported with SD.

Consistent manageable adverse events observed. With a total of 85 patients enrolled, the study continues to demonstrate a low rate of Grade 3/4 adverse events (AEs), with only 9.4% (8/85) of patients experiencing Grade 3/4 AEs attributable to the drug (vs. the previously reported 13.6% (8/59)). The one dose limiting toxicity (DLT) accounted for was previously reported, related to a Grade 3 increase in creatinine levels in a patient with diabetes at the 250 mg TID dose. Additionally, most of the Grade 3 elevations in transaminases occurred at the TID schedule in 18.8% (6/32) patients, with only one Grade 3 event occurring among the patients receiving the BID regimen (1/53), which is the recommended Phase 2 dose (R2PD). We also note that the rates of adverse events are likely in line with patients with advanced disease, given the heavily pretreated population.

We remain bullish on CALA. Calithera is an early-stage, oncology-focused drug discovery and development company attempting to exploit the increasing knowledge of the cancer cell's ability to hijack the energy production mechanisms required for the utilization of energy from a variety of sources. The company's first product candidate, CB-839, is a novel inhibitor of glutaminase, an enzyme that converts glutamine to glutamate, the latter of which is a critical feedstock for the cell's energy production system. The company was founded by Susan and Chris Molineaux, two of the main founders of Proteolix, the company that developed Kyprolis (carfilzomib) and that was eventually sold to Onyx for $700MM. Onyx, in turn, sold to Amgen (AMGN, NC) in 2013 for $10 billion.

FIGURE 1. Upcoming Catalysts

Timing	Drug	Catalyst
4Q15	CB-839	Additional data from Phase I single agent trials in solid tumors (expansion cohorts) at AACR-NCI-EORTC
4Q15	CB-1158	Preclinical data from arginase inhibitor at AACR-NCI-EORTC
4Q15	CB-839	Additional data from Phase I heme tumors at ASH (single agent data)
2H15	CB-839	Initial data from Phase I combination trials
YE15	CB-839	Intitiation of combination expansion cohorts
YE15	CB-839	Completion of enrollment of monotherapy expansion cohorts
1H16	CB-1158	IND filing for arginase inhibitor
mid-2016	CB-839	Phase I combination trial solid tumor data
mid-2016	CB-839	Phase I clinical trial data in myeloma and AML (both monotherapy and combination)

Source: JMP Securities LLC and Company Reports

FIGURE 2. Income Statement

Calithera Biosciences (CALA)	1Q15A	2Q15A	3Q15E	4Q15E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Income Statement ($MM)	1Q15A	2Q15A	3Q15E	4Q15E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Product Sales and Royalties:															
CB-839															
US Sales					-	-	-	54.6	310.5	625.0	965.1	1,268.5	1,459.7	1,551.8	1,616.9
ROW Royalties					-	-	-	-	6.3	41.1	86.6	132.9	182.8	211.1	226.2
Total Product Sales and Royalties	-	-	-	-	-	-	-	54.6	316.8	666.1	1,051.7	1,401.4	1,642.5	1,762.9	1,843.1
Cost of Goods Sold						-	-	6.5	37.3	75.0	115.8	152.2	175.2	186.2	194.0
Gross Profit	-	-	-	-	-	-	-	48.0	279.5	591.1	935.9	1,249.2	1,467.3	1,576.7	1,649.1
Operating Expenses:															
Research and development	5.6	5.5	7.3	8.0	26.5	52.9	105.9	164.1	213.3	256.0	281.5	309.7	340.7	374.7	412.2
% Growth					*60.6%*	*100.0%*	*100.0%*	*55.0%*	*30.0%*	*20.0%*	*10.0%*	*10.0%*	*10.0%*	*10.0%*	*10.0%*
% Total US Net Sales								*301%*	*69%*	*41%*	*29%*	*24%*	*23%*	*24%*	*25%*
General and administrative	2.2	2.3	2.3	2.4	9.3	20.4	61.2	110.2	159.8	199.8	219.8	239.5	258.7	271.6	285.2
Total operating expenses	7.9	7.874	9.6	10.4	35.7	73.3	167.1	274.3	373.1	455.7	501.3	549.2	599.4	646.4	697.4
Operating income (loss)	(7.9)	(7.874)	(9.6)	(10.4)	(35.7)	(73.3)	(167.1)	(226.3)	(93.6)	135.4	434.6	700.0	868.0	930.3	951.7
Operating margin (%)								*-414.6%*	*-29.5%*	*20.3%*	*41.3%*	*49.9%*	*52.8%*	*52.8%*	*51.6%*
Interest income		0.056													
Interest expense															
Total other income, net	-	0.056	-	-	-	-	-	-	-	-	-	-	-	-	-
Pretax income (loss)	(7.9)	(7.818)	(9.6)	(10.4)	(35.7)	(73.3)	(167.1)	(226.3)	(93.6)	135.4	434.6	700.0	868.0	930.3	951.7
Income tax benefit (provision)					0.0	0.0	0.0	0.0	4.7	(13.5)	(86.9)	(210.0)	(303.8)	(325.6)	(333.1)
Tax Rate									*5%*	*10%*	*20%*	*30%*	*35%*	*35%*	*35%*
Comprehensive income (loss)	(7.9)	(7.818)	(9.6)	(10.4)	(35.7)	(73.3)	(167.1)	(226.3)	(88.9)	121.8	347.7	490.0	564.2	604.7	618.6
Basic EPS to common shareholders	$ (0.40)	$ (0.44)	$ (0.50)	$ (0.52)	**$ (1.86)**	**$ (3.63)**	**$ (6.63)**	**$ (7.43)**	**$ (2.78)**	**$ 3.63**	**$ 9.86**	**$ 13.23**	**$ 14.51**	**$ 14.81**	**$ 14.43**
Diluted EPS to common shareholders	$ (0.40)	$ (0.44)	$ (0.50)	$ (0.52)	**$ (1.86)**	**$ (3.63)**	**$ (6.63)**	**$ (7.43)**	**$ (2.78)**	**$ 3.63**	**$ 9.86**	**$ 13.23**	**$ 14.51**	**$ 14.81**	**$ 14.43**
Basic shares outstanding	19.7	18.0	19.0	20.2	19.2	20.2	25.2	30.5	32.0	33.6	35.3	37.0	38.9	40.8	42.9
Diluted shares outstanding	19.7	18.0	19.0	20.2	19.2	20.2	25.2	30.5	32.0	33.6	35.3	37.0	38.9	40.8	42.9

Source: JMP Securities LLC and Company Reports

Company Description

Calithera Biosciences, based in San Francisco, CA, is a clinical-stage biotechnology company focused on the discovery and development of novel small molecules directed against cancer and immune cell metabolism to treat both solid tumor and hematologic malignancies. The company's lead product candidate, CB-839, is an internally discovered and wholly owned potent, oral selective inhibitor of glutaminase. Inhibition of glutaminase by CB-839, in effect, starves cancer cells of glutamate - a critical substrate for cancer cell metabolism, growth, and survival. CB-839 is currently in Phase I analysis in both solid and hematologic tumors. Planned Phase Ib cohorts in combination with standard of care agents in triple negative breast cancer and multiple myeloma are expected to be initiated. A second wholly owned pre-clinical candidate is Calithera's first-in-class arginase inhibitor, directed at immune checkpoint modulation and engaging the activation of cytotoxic T-cells. Calithera intends to submit an IND to the FDA for the arginase program in late 2015.

Investment Risks

Potential risks to our price target include, but are not limited to, clinical, regulatory, commercial, and competitive factors.

Scientific and clinical. Drug development is an inherently risky business. Cancer metabolism and, specifically, the role of glutaminase in cancer pathogenesis, remains largely unproven, creating significant risk associated with Calithera's scientific platform. Like all clinical trials, CB-839 clinical development carries some risk of failure. CB-839 may fail to maintain the requisite safety or to demonstrate meaningful efficacy to warrant further development through to regulatory approval.

Regulatory and commercial. The ability of Calithera or its potential partners to market its drugs depends on those drugs obtaining approval from the FDA and foreign regulatory agencies. Failure to achieve approval or delays in the timelines to approval could negatively impact the company's share price.

Competitive. Oncology drug development is an increasingly competitive field. Calithera faces competition from companies developing small molecule therapies also directed at cancer cell metabolism in ways that may resemble those of Calithera's pipeline. Small molecule oncology therapies employing other mechanisms of action are also in development by several biopharma companies to treat similar patient populations to that of CB-839 and may yield superior risk-benefit outcomes. Some of these companies may have access to greater resources, development, and commercial expertise compared to Calithera.

Financial. We anticipate that Calithera may seek additional equity financing in the form of a secondary offering in order to complete the development of CB-839 and advance its future pipeline candidates, exposing existing shareholders to some degree of dilution risk.

JMP FACTS AND DISCLOSURES

Analyst Certification:

The research analyst(s) who prepared this report does/do hereby certify that the views presented in this report are in accordance with my/our personal views on the securities and issuers discussed in this report. As mandated by SEC Regulation AC no part of my/our compensation was, is or will be directly or indirectly related to the specific views or recommendations expressed herein. This certification is made under the obligations set forth in SEC Regulation AC. Any other person or entity may not use it for any other purpose. This certification is made based on my/our analysis on the date of this report's publication. I/We assume no obligation to update this certification to reflect any facts,circumstances or events that may subsequently come to my/our attention. Signed Michael G. King

JMP Securities Disclosures:

JMP Securities currently makes a market in the security of Calithera Biosciences, Inc.

JMP Securities expects to receive OR intends to seek compensation for investment banking services from Calithera Biosciences, Inc. in the next 3 months.

JMP Securities Investment Opinion Definitions:

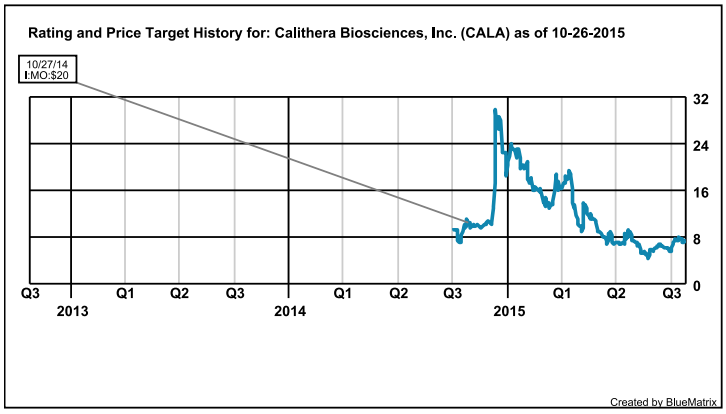
Market Outperform (MO): JMP Securities expects the stock price to outperform relevant market indices over the next 12 months.
Market Perform (MP): JMP Securities expects the stock price to perform in line with relevant market indices over the next 12 months.
Market Underperform (MU): JMP Securities expects the stock price to underperform relevant market indices over the next 12 months.

JMP Securities Research Ratings and Investment Banking Services: (as of October 27, 2015)

JMP Rating	Regulatory Equivalent	# Co's Under Coverage	*% of Total*	Regulatory Equivalent	# Co's Under Coverage	*% of Total*	# Co's Receiving IB Services in Past 12 Months	*% of Co's With This Rating*
MARKET OUTPERFORM	Buy	305	*63.94%*	Buy	305	*63.94%*	84	*27.54%*
MARKET PERFORM	Hold	148	*31.03%*	Hold	148	*31.03%*	15	*10.14%*
MARKET UNDERPERFORM	Sell	6	*1.26%*	Sell	6	*1.26%*	0	*0%*
COVERAGE IN TRANSITION		17	*3.56%*		17	*3.56%*	0	*0%*
TOTAL:		477	*100%*		477	*100%*	100	*20.96%*

Stock Price Chart of Rating and Target Price Changes:

Note: First annotation denotes initiation of coverage or 3 years, whichever is shorter. If no target price is listed, then the target price is N/A. In accordance with NASD Rule 2711, the chart(s) below reflect(s) price range and any changes to the rating or price target as of the end of the most recent calendar quarter. The action reflected in this note is not annotated in the stock price chart. Source: JMP Securities.



JMP Disclaimer:

JMP Securities LLC (the “Firm”) compensates research analysts, like other Firm employees, based on the Firm’s profitability, which includes revenues from the Firm’s institutional sales, trading, and investment banking departments as well as on the quality of the services and activities performed that are intended to benefit the Firm’s institutional clients. These data have been prepared by JMP Securities LLC for informational purposes only and are based on information available to the public from sources that we believe to be reliable, but we do not guarantee their accuracy or completeness. Any opinions and projections expressed herein reflect our judgment at this date and are subject to change without notice. These data are neither intended nor should be considered as an offer to sell or a solicitation or a basis for any contract for the purchase of any security or other financial product. JMP Securities LLC, its affiliates, JMP Group LLC, Harvest Capital Strategies LLC, and their respective partners, directors, officers, and associates may have a long or short position in, may act as a market maker for, or may purchase or sell a position in the securities mentioned herein. JMP Securities LLC or its affiliates may be performing, have performed, or seek to perform investment banking, advisory, or other services and may have acted as manager or co-manager for a public offering of securities for any company mentioned herein. The reader should assume that JMP Securities LLC will solicit business from the company covered in this report. Members of our Sales and Trading Department provide oral and/or written market opinions and trading strategies to our clients that reflect their personal opinions about stocks that are the subject of the firm's research reports. Our research analysts discuss trading strategies with clients that sometimes reflect short-term expectations for the price of the securities that are the subject of research reports. These trading strategies are distinct from the analysts' fundamental rating for the stock, which is based upon the analysts' view compared to other stocks under coverage for the relevant time period. © Copyright 2015. All rights reserved by JMP Securities LLC. JMP Securities LLC is a member of FINRA, NASDAQ, and SIPC.

Jeffrey H. Spurr
Director of Research
(415) 835-3903

RESEARCH PROFESSIONALS

FINANCIAL SERVICES

Alternative Asset Managers
Devin Ryan (212) 906-3578
Brian McKenna (212) 906-3545

Commercial & Specialty Finance
Christopher York (415) 835-8965
Andrius Ellner (415) 835-8962

Consumer Finance
David M. Scharf (415) 835-8942
Douglas Greiner (212) 906-3525

Financial Processing & Outsourcing
David M. Scharf (415) 835-8942
Douglas Greiner (212) 906-3525

Insurance
Matthew J. Carletti (312) 768-1784
Christine Worley (312) 768-1786
Solomon Mindlin (312) 768-1788

Investment Banks & Brokers
Devin Ryan (212) 906-3578
Brian McKenna (212) 906-3545

Mortgage Operating Companies
REITs: Agency, Hybrid, & Commercial Mortgage
Steven C. DeLaney (404) 848-7773
Trevor Cranston, CFA (415) 869-4431
Charter Robinson (757) 613-8955
Benjamin Zucker (212) 906-3529

HEALTHCARE

Biotechnology
Liisa A. Bayko (312) 768-1785
Masha Chapman (415) 835-8944
Bhumika Sharma, PhD (312) 768-1795
Jason N. Butler, PhD (212) 906-3505
Harry Jenq, PhD (212) 906-3509
Michael G. King, Jr. (212) 906-3520
Eric Ekland (212) 906-3540
Naureen Quibria, PhD (212) 906-3514

Healthcare Services & Facilities
Peter L. Martin, CFA (415) 835-8904
Aaron Hecht (415) 835-3963
Brian Riley (415) 835-8908

Life Science Tools & Diagnostics

Medical Devices & Supplies
David Turkaly (212) 906-3563
John Gillings (212) 906-3564

Specialty Pharmaceuticals
Donald Ellis (212) 906-3507
Nazibur Rahman (212) 906-3519

REAL ESTATE

Housing & Land Development
Peter L. Martin, CFA (415) 835-8904
Aaron Hecht (415) 835-3963
Bharathwajan Iyengar (415) 835-3902

Lodging & Leisure
Robert A. LaFleur (212) 906-3510
Whitney Stevenson (212) 906-3538

Property Services
Mitch Germain (212) 906-3546
Peter Lunenburg (212) 906-3537

REITs: Healthcare, Residential, & Specialty
Peter L. Martin, CFA (415) 835-8904
Aaron Hecht (415) 835-3963
Brian Riley (415) 835-8908

REITs: Diversified, Industrial, Office, & Retail
Mitch Germain (212) 906-3546
Peter Lunenburg (212) 906-3537

Residential Services
Peter L. Martin, CFA (415) 835-8904
Aaron Hecht (415) 835-3963
Bharathwajan Iyengar (415) 835-3902

TECHNOLOGY

Internet Security & Communications Infrastructure
Erik Suppiger (415) 835-3918
John Lucia (415) 835-3920

Internet & Digital Media
Ronald V. Josey III (212) 906-3528
Ignatius Njoku (415) 835-8960
Andrew Boone, CFA (415) 835-3957
Shweta Khajuria (415) 835-8916

Software
Patrick Walravens (415) 835-8943
Peter Lowry (415) 869-4418
Mathew Spencer (415) 835-8930
Greg McDowell (415) 835-3934
Rishi Jaluria (415) 835-3961

Wireless & Cloud Computing Technologies
Alex Gauna (415) 835-8998

ADDITIONAL CONTACTS

Thomas R. Wright
Director of Equities
(212) 906-3599

Thomas Healy
Head of Institutional Sales
(212) 906-3533

600 Montgomery Street, Suite 1100
San Francisco, CA 94111
www.jmpsecurities.com