

# **Equity Research**

June 9, 2015

Price: \$75.15 (06/8/2015)

Price Target: \$108.00 (Prior \$95.00)

#### **OUTPERFORM (1)**

#### Ritu Baral

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#### **Key Data**

Symbol NASDAQ: SAGE 52-Week Range: \$81.20 - 24.25 Market Cap (MM): \$2,131.8 Net Debt (MM): \$(127.8) Cash/Share: \$4.99 Dil. Shares Out (MM): Enterprise Value (MM): \$2,018.6 ROIC NA ROE (LTM): NA BV/Share: \$4.15 Dividend: NA

FY (Dec)	2014E	2015E	2016E
Earnings Per Sha	are		
Q1	-	(0.66)A	-
Q2	-	(0.73)	-
Q3	-	(0.79)	-
Q4	-	(0.84)	-
Year	(1.67)A	(3.02)	(3.34)
P/E	NM	NM	NM
Consensus EPS	-	(2.82)	(3.35)
Consensus source: T	homson Reuter:	S	

# Revenue (MM) Year 0.0 0.0 0.0

# Sage Therapeutics

## Company Update

# Positive Ph1/2 Exploratory PPD Results: Validates Mechanism in Large Unmet Need

#### The Cowen Insight

SAGE today announced positive top-line data in an exploratory Ph1/2 trial of '547 in Post-Partum Depression (PPD). We see this data as remarkably promising despite small numbers and open-label design. As a result, we add PPD to our valuation, increasing our PT from \$95 to \$108. We further think the data add credence to potential applications of SAGE's GABA compounds on neuropsychiatric conditions.

# Ph1/2 '547 Exploratory Results on Post-Partum Depression (PPD) Promising: Consistent, Significant Reduction in Hamilton Depression Scale in 24hrs

SAGE announced topline data from its Ph1/2 exploratory trial of neuroactive steroid SAGE-547 (allogpregnanolone) in 4 women with PPD and inadequate response to prior antidepressants. Adjunctive '547 therapy was associated with statistically significant improvement in the Hamilton Depression (HAM-D) scores within 24 hrs of treatment (p=0.001). At the end of the 60 hr treatment period, patients with mean baseline HAM scores of 26.5 improved to a mean score of 1.8. All 4 patients had consistent improvement in CGI-I scores. Notably, all patients began with severe HAM scores (>24), and all reduced to <7 (symptom-free). PPD is characterized by severely depressed moods and irritability within 4 weeks of giving birth and can manifest as late as 40 weeks postpartum. It is associated with low levels of allopregnanolone and affects up to 1M women in the US annually. 20% do not respond to current standard of care.

# HAM-D Response Rate Compelling Despite Small Numbers, Open-Label Design. Benign Safety Consistent with Ph2 SRSE Experience

We note this single center study was originally designed to enroll 10-15 patients but was stopped early for overwhelming efficacy. SAGE indicated while the data is openlabel, a 10-15% PBO 'responder' rate would have been expected. While PBO rates in neuro trials can range up to 30%: 1) Response is rarely symptom resolution and 2) The current trial showed a 100% resolution rate. '547 was safe and well tolerated, with only a small sedation signal. Additional patient followup is tbd, and there is no retreatment protocol currently. We expect full data to be published later this year, which should give more data detail.

#### **Upcoming Ph2 PPD Trial: Our First Thoughts on Design**

We look forward to SAGE starting of a PBO-controlled Ph2 study of '547 in PPD, likely in early 2016. While this trial, which we anticipate will have <100 pts, will use '547, we think final registrational trial maybe done with an optimized follow-on GABA-A compound. This trial served as proof of mechanism for Sage's GABA platform in non-seizure disorders. We note the '547 exploratory trial in essential tremor is still ongoing, and on track to produce first data in mid 2015.

**Equity Research** 

# **Sage Therapeutics**June 9, 2015

#### June 9, 20



#### **Our Investment Thesis**

**Base Case Assumptions** 

■ SAGE-547 is safe, effective, and

superior to standard of care with

■ SAGE-689 and sage-217 are safe

efficacy similar to Ph1/2 data (~75%

and well tolerated and generate solid

We think Ph3 SAGE-547 could be a paradigm-changing new treatment option for super-refractory status epilepticus (SRSE), significantly decreasing the mortality and morbidity associated with the condition. Based on the strength of the Ph1/2 produced to date, we are optimistic for Ph3 success and think the drug could see widespread use in SRSE with ~\$1B peak sales. We think '547 success derisks the remainder of SAGE's GABA-based platform, at least for the indications related to seizure. '689 and '217 are in IND enabling studies as adjunctive treatments to RSE and orphan epilepsies, respectively.

# Upside Scenario

- SAGE-547 achieves higher than expected pricing and extremely high penetration rate, including potential earlier line use.
- SAGE-547 is effective in other indications
- Sage's follow-on compounds quickly generate impressive clinical data in multiple other indications

# **Forthcoming Catalysts**

- SAGE-547 Exploratory Essential Tremor Data (2H15)
- SAGE-547 Ph3 Data (2H16)
- SAGE-689 IND (2H15)
- SAGE-217 IND (2H15)
- Sage announces additional follow-on compounds (2016)

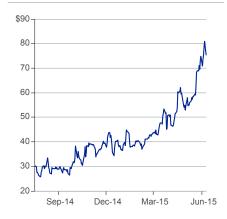
#### **Downside Scenario**

- SAGE-547 fails the current Ph3 clinical trial
- SAGE-547 is not approved by the FDA and/or EMA
- SAGE-547 does not achieve expected pricing
- SAGE-547 does not achieve high levels of uptake

#### **Price Performance**

response rate)

clinical efficacy data



Source: Bloomberg

#### **Company Description**

Sage Therapeutics focuses on developing novel therapeutics for CNS-related indications with clear a unmet need. Lead compound SAGE-547 is in Ph3 for Super Refractory Status Epilepticus (SRSE), a disease that affects ~25K individuals/year in the US, and has high mortality and very poor current treatment options. Follow-on GABA-ergic compounds SAGE-689 and SAGE-217 are in development for Refractory Status Epilepticus (RSE) and orphan epilepsies, respectively. Sage also plans to develop an NMDA-receptor related compound.

#### **Analyst Top Picks**

	Ticker	Price (06/8/2015)	Price Target	Rating
Amicus Therapeutics	FOLD	\$13.06	\$19.00	Outperform
Cempra	CEMP	\$35.81	\$43.00	Outperform

# Cowen and Company

**Equity Research** 

# Sage Therapeutics

June 9, 2015

## We Model \$729MM Peak US Sales in PPD

We model \$729MM in peak US sales for PPD, with peak share at 33% in severe patients who do not respond well to available therapies. Based on assuming 2020 launch and 20% chance of success, the PPD indication adds ~\$14 to our pNPV.



	2013A	2014A	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E
Revenues										
SAGE-547 for SRSE	0.0	0.0	0.0	0.0	0.0	98.3	440.2	767.6	1,020.7	1,047.2
Total Revenues	0.0	0.0	0.0	0.0	0.0	98.3	440.2	767.6	1,020.7	1,047.2
Operating Expenses										
R&D	14.4	24.1	63.9	80.0	70.0	55.0	158.5	138.2	102.1	78.5
G&A	3.9	9.7	16.0	18.0	25.0	40.0	40.0	40.0	40.0	40.0
Total Operating Expenses	18.3	33.8	79.9	90.0	95.0	95.0	198.5	178.2	142.1	118.5
Loss from Operations	(18.3)	(33.8)	(79.9)	(90.0)	(95.0)	3.3	241.7	589.5	878.6	928.6
Interest income (expense)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other income (expense)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other income (expense)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net loss	(18.3)	(33.8)	(79.9)	(90.0)	(95.0)	3.3	241.7	589.5	878.6	928.6
Accretion of convertible preferred										
stock to redemption value	(0.0)	(2.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net loss attributable to common										
stockholders	(18.3)	(36.1)	(79.9)	(90.0)	(95.0)	3.3	241.7	589.5	878.6	928.6
EPS (basic and diluted)	\$ (12.26)	\$ (1.67)	\$ (3.02)	\$ (3.34)	\$ (3.45)	\$ 0.12	\$ 8.45	\$ 20.20	\$ 29.51	\$ 30.58
Number of shares (basic)	1.49	21.57	26.43	26.96	27.50	28.05	28.61	29.19	29.77	30.37
Number of shares (date)	1.49	21.57	26.43	26.96	27.50	28.05	28.61	29.19	29.77	30.37

Source: Cowen and Company

# SAGE Quarterly P&L

	2013A	2014A	1Q15A	2Q15E	3Q15E	4Q15E	2015E
Revenues							
SAGE-547 for SRSE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Revenues	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Operating Expenses							
R&D	14.4	24.1	12.9	15.0	17.0	19.0	63.9
G&A	3.9	9.7	4.0	4.0	4.0	4.0	16.0
Total Operating Expenses	18.3	33.8	16.9	19.0	21.0	23.0	79.9
Loss from Operations	(18.3)	(33.8)	(16.9)	(19.0)	(21.0)	(23.0)	(79.9)
Interest income (expense)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other income (expense)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0
Net loss	(18.3)	(33.8)	(16.9)	(19.0)	(21.0)	(23.0)	(79.9)
Accretion of convertible preferred							
stock to redemption value	(0.0)	(2.3)	0.0	0.0	0.0	0.0	0.0
Net loss attributable to common stockholders	(18.3)	(36.1)	(16.9)	(19.0)	(21.0)	(23.0)	(79.9)
EPS (basic and diluted)	\$ (12.26)					(0.84)	
Number of shares (basic)	1.49	21.57	25.66	26.17	26.69	27.23	26.43
Number of shares (diluted)	1.49	21.57	25.66	26.17	26.69	27.23	26.43

Source: Cowen and Company

# Sage Therapeutics

Equity Research

June 9, 2015

#### SAGE-547 Market Model

	2016		2017		2018		2019		2020		2021		2022		2023	2024		2025		2026		2027		2028
106	150,000		151 500		150.015		154 545		150 001		157.050		150 000		100.000	100 400		104.050		105 000		107.050		169.024
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									- , -															25,354
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																								75%
																								13311
206		\$	-			Ś		Ś		¢		¢		¢			s		s		Ś			74.602
		\$	-	\$	98.33	\$	405.19	\$	626.14	\$		\$	830.66	\$	. ,		\$	908.21	\$	935.64	\$	963.90	\$	993.01
1% 37% 50% \$MM)	75,000 27,750 13,875	\$ <b>\$</b>	75,750 28,028 14,014 <i>70%</i> 0% 0 45,000	\$ <b>\$</b>	76,508 28,308 14,154 70% 096 0 35,000	\$ <b>\$</b>	77,273 28,591 14,295 70% 1001 35,000 35.0	\$ <b>\$</b>	78,045 28,877 14,438 70% 40% 4043 35,000 141.5	\$ <b>\$</b>	78,826 29,166 14,583 70% 60% 6,125 35,000 214.4	\$ <b>\$</b>	79,614 29,457 14,729 70% 60% 6,186 35,000 <b>216.5</b>	\$ <b>\$</b>	,	81,214 30,049 15,025 70% 60% 6,310 \$ 35,000 \$ 220.9	\$ <b>\$</b>	82,026 30,350 15,175 70% 60% 6,373 35,000 <b>223.1</b>	\$ <b>\$</b>	82,847 30,653 15,327 70% 60% 6,437 35,000 <b>225.3</b>	\$ <b>\$</b>	,		84,512 31,269 15,635 70% 60% 6,567 35,000 229.8
IM)		\$	-	\$	98.3	\$	440.2	\$	767.6	\$	1,020.7	\$	1,047.2	\$	1,074.4	\$ 1,102.4	\$	1,131.3	\$	1,160.9	\$	1,191.4	\$	1,222.8
on (US) 20%									200,000 800,000 <i>5%</i> 10,000 10,000	\$	204,000 816,000 10% 20,400 10,000	\$	208,080 832,320 20% 41,616 10,000	\$	212,242 848,966 25% 53,060 10,000	,	\$	220,816 883,265 33% 72,869 10,000	\$	225,232 900,930 33% 74,327 10,000	\$	229,737 918,949 33% 75,813 10,000	\$	1,171,659 234,332 937,328 33% 77,330 10,000
	37% 50% \$MM) IM) US) on (US)	1% 150,000 30% 45,000 50% 22,500  2%  1% 75,000 37% 27,750 50% 13,875  \$MM0  IM)  US) on (US) 20%	196 150,000 3096 45,000 5096 22,500  296 \$ \$  196 75,000 3796 27,750 5096 13,875  \$ \$MM) \$ \$  US) on (US) 2096	196 150,000 151,500 3096 45,000 45,450 5096 22,500 22,725 7096 0 296 \$ 60,000 \$ -  196 75,000 75,750 3796 27,750 28,028 5096 13,875 14,014 7096 0 \$ \$ 45,000 \$ -  IM) \$ -  IM) \$ -	196 150,000 151,500 3096 45,000 45,450 5096 22,500 22,725 7096 0 296 \$ 60,000 \$ \$ - \$  196 75,000 75,750 3796 27,750 28,028 5096 13,875 14,014 7096 096 0 \$ 45,000 \$ \$ - \$  SMMO \$ - \$  IM) \$ - \$  IS) On (US) 2096	196 150,000 151,500 153,015 3096 45,000 45,450 45,905 5096 22,500 22,725 22,952 7096 7096 096 1096 296 \$ 60,000 \$ 61,200 \$ - \$ 98.33  196 75,000 75,750 76,508 3796 27,750 28,028 28,308 5096 13,875 14,014 14,154 7096 7096 0 0 0 \$ 45,000 \$ 35,000 \$ - \$ - \$ - \$  IM) \$ - \$ 98.3  IS) on (US) 2096	196 150,000 151,500 153,015 3096 45,000 45,450 45,905 5096 22,500 22,725 22,952 7096 7096 0 1607 296 \$ 60,000 \$ 61,200 \$ \$ - \$ 98.33 \$  196 75,000 75,750 76,508 3796 27,750 28,028 28,308 5096 13,875 14,014 14,154 7096 096 096 \$ \$ 45,000 \$ 35,000 \$ \$ - \$ - \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	196 150,000 151,500 153,015 154,545 3096 45,000 45,450 45,905 46,364 5096 22,500 22,725 22,952 23,182 7096 7096 7096 7096 0 1607 6491 296 \$ 60,000 \$ 61,200 \$ 62,424 \$ - \$ 98.33 \$ 405.19  196 75,000 75,750 76,508 77,273 3796 27,750 28,028 28,308 28,591 13,875 14,014 14,154 14,295 5096 13,875 14,014 14,154 14,295 5096 0 0 1001 \$ 45,000 \$ 35,000 \$ 35,000 \$ \$ 45,000	196 150,000 151,500 153,015 154,545 3096 45,000 45,450 45,905 46,364 5096 22,500 22,725 22,952 23,182 7096 7096 7096 7096 0 1607 6491 296 \$ 60,000 \$ 61,200 \$ 62,424 \$ \$ - \$ 98.33 \$ 405.19 \$  196 75,000 75,750 76,508 77,273 3796 27,750 28,028 28,308 28,591 5096 13,875 14,014 14,154 14,295 7096 7096 7096 0 0 0 1001 \$ 45,000 \$ 35,000 \$ 35,000 \$ \$ \$ 45,000 \$ 35,000 \$ 35,000 \$ \$ \$ \$ - \$ - \$ 35.0 \$  IM) \$ - \$ 98.3 \$ 440.2 \$  IS) On (US) 2096	196 150,000 151,500 153,015 154,545 156,091 3096 45,000 45,450 45,905 46,364 46,827 5096 22,500 22,725 22,952 23,182 23,414 7096 7096 7096 7096 6096 0 1607 6491 9834 296 \$ 60,000 \$ 61,200 \$ 62,424 \$ 63,672 \$ - 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\$ 98.33 \$ 405.19 \$ 826.14 \$ 806.31 \$ 830.66 \$ \$ \$ \$ 45,000 \$ 28,028 28,308 28,591 28,877 29,166 29,457 50% 13,875 14,014 14,154 14,295 14,438 14,583 14,729 60% 0 0 1001 4043 6,125 6,186 \$ \$ 45,000 \$ 35,000 \$ 35,000 \$ 35,000 \$ 35,000 \$ 35,000 \$ 35,000 \$ 35,000 \$ 35,000 \$ 35,000 \$ 35,000 \$ 35,000 \$ 35,000 \$ 10,000 0 1,000,000 1,000,000 1,000,000 10,000 0 10,000 0 10,000 0 10,000 0 10,000 0 10,000 0 10,000 0 10,000 0 10,000 0 1,000,000	196 150,000 151,500 153,015 154,545 156,091 157,652 159,228 160,820 3096 45,000 45,450 45,905 46,364 46,827 47,295 47,768 48,246 5096 22,500 22,725 22,952 23,182 23,414 23,648 23,884 24,123 7096 7096 7096 7096 7096 7096 7096 7096	196 150,000 151,500 153,015 154,545 156,091 157,652 159,228 160,820 162,429 3096 45,000 45,450 45,905 46,364 46,827 47,295 47,768 48,246 48,729 5096 22,500 22,725 22,952 23,182 23,414 23,648 23,884 24,123 24,364 7096 7096 7096 7096 7096 7096 7096 7096	196	196	196 150,000 151,500 153,015 154,545 156,091 157,652 159,228 160,820 162,429 164,053 306 45,000 45,450 45,905 46,364 46,827 47,295 47,768 48,246 48,729 49,216 5096 22,500 22,725 22,952 23,182 23,414 23,648 23,884 24,123 24,364 24,608 7096 7096 7096 7096 7096 7096 7096 7096	196	196	19th 150,000	196

Source: Cowen and Company

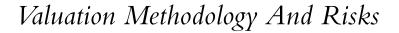
# SAGE pNPV

NPV (US\$)	108.34
Current price (US\$)	67.00
Upside (Downside)	62%
NoSH	25.7
Current market cap (US\$m	
Implied market cap (US\$m	)
Pharma PE	15x
Discount rate	20%
Current year	2015.2

Drug name	Indication	Status	Estimated launch	Years to Launch	Years to Peak Sales	Success?	Peak Sales (US\$m)	Probability weighted Peak Sales (US\$m)	Royalty	Profitability	Probability weighted Peak Profit (US\$m)	Discount Factor	NPV (US\$)
SAGE-547	SRSE (US)	Phase 3	2018	2.8	7.8	65%	856	556	96%	100%	533.98	4.11	78.48
follow-on	SRSE (EU) PPD	Phase 3 Ph1/2	2019 2020	3.8 4.8	8.8 9.8	60% 20%	221 729	133	96% 96%	100% 100%	127.22 139.91	4.93 5.92	15.58 14.28
												Total	108.34

Source: Cowen and Company

June 9, 2015



### **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**

SAGE's lead program has been successful in a Ph1/2 trial. This, however, does not guarantee success in future trials as well as success in trials for SAGE's follow-on compounds, '217 and '689. Clinical success does also not guarantee commercial success, and while we believe '547 can achieve \$75K pricing and a 75% market share in the US, these are our projections and SAGE may not reach these sales figures.



#### **Stocks Mentioned In Important Disclosures**

Ticker	Company Name
FOLD	Amicus Therapeutics
CEMP	Cempra
SAGE	Sage Therapeutics

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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

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#### 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

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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

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Distribution of Ratings/Investment Banking Services (IB) as of 03/31/15

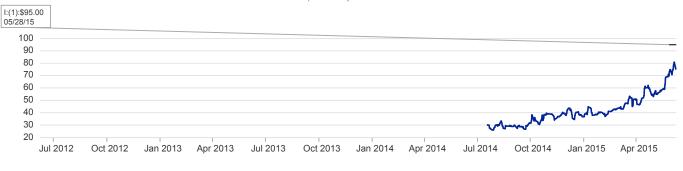
Rating	Count	Ratings Distribution	Count	IB Services/Past 12 Months
Buy (a)	450	58.67%	103	22.89%
Hold (b)	302	39.37%	8	2.65%
Sell (c)	15	1.96%	0	0.00%

(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.

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#### Sage Therapeutics Rating History as of 06/08/2015

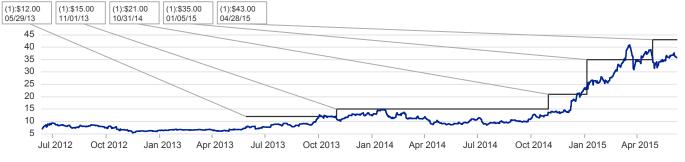
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#### Cempra Rating History as of 06/08/2015

powered by: BlueMatrix





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# Sage Therapeutics

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#### Amicus Therapeutics Rating History as of 06/08/2015





#### **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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