August 12, 2014

OUTPERFORM

Reason for report:

INITIATION

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SAGE THERAPEUTICS, INC.

Initiating at OP: GABA Modulation Platform Charging Ahead in Status Epilepticus

• **Bottom Line:** We are initiating coverage of SAGE with an Outperform rating and a $46 price target in 12 months. SAGE's lead product SAGE-547 has produced highly compelling data in 10 patients with super refractory status epilepticus (SRSE), an orphan indication with an extremely poor prognosis and mortality rate. We believe SAGE shares are poised to appreciate ahead of top-line Phase I/II '547 data in 2H14 and the advancement of follow-on compounds SAGE-689 and SAGE-217, which operate via a similar mechanism-of-action and are expected to enter trials in 2015 for related seizure indications.

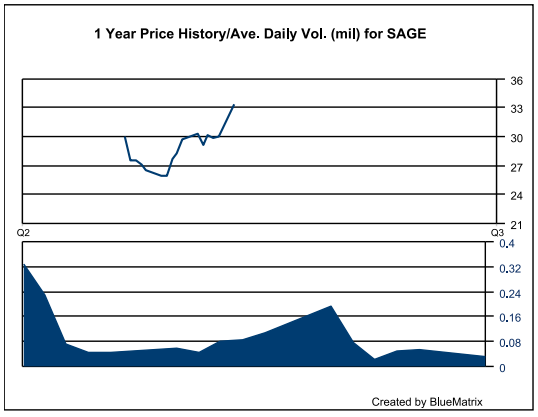
• **Lead product SAGE-547 is a potent positive allosteric modulator of GABA which has demonstrated robust clinical effects in an emergency IND program,** where 5 out of 6 SAGE-547-treated SRSE patients (each of whom had spent over 30 days in the ICU and had failed many prior therapies) were successfully weaned out of a medically induced coma and subsequently cured of status. This has led to rapid advancement of '547 into a proof-of-concept Phase I/II, where so far 4 out of 4 SAGE-547-treated SRSE patients have been weaned off anesthesia while on '547 therapy and 3 have achieved sustained resolution of SE. Full Phase I/II results are expected by YE14, which if positive could drive shares higher and precipitate 2015 advancement into a pivotal Phase III.

• **We believe SRSE presents well over a $1B market opportunity worldwide,** and at a $60k annual SAGE-547 price and 50% market penetration in the US, we estimate peak gross WW sales of ~$1.3B in 2023. Upside to this number could come from both higher pricing (SRSE patients are estimated to cost hospitals ~$140K on average) and/or higher penetration in SRSE or use in refractory status (the precursor to SRSE), where the current standard-of-care is to place a patient into a medically-induced coma.

• **Beyond '547, SAGE is advancing a platform of positive allosteric modulators of GABA** which hold the potential to treat 2nd-line status epilepticus, refractory status, and other seizure disorders including Dravet syndrome. SAGE-689 is currently in preclinical development for neuroanesthesia and status epilepticus and is expected to enter a Phase I trial in 2015. Meanwhile, SAGE-217 is being developed as an intravenous therapy, as well as an oral step-down therapy for refractory status and other rare epilepsy conditions. These products work via a similar mechanism-of-action to SAGE-547 but have varying half-lives which could render them more suitable to other types of status as well as outpatient seizure conditions if successfully formulated as orally-administered therapies. Our current price target attributes ~$11/share to SAGE's platform which we believe holds the potential to expand significantly as clinical catalysts are realized, especially given the high degree of operating leverage with '547, '689, and '217 going after different stages of similar underlying seizure conditions.

Key Stats:	**(NASDAQ:SAGE)**
S&P 600 Health Care Index:	**1,288.59**
Price:	**$33.40**
Price Target:	$46.00
Methodology:	DCF analysis with 12% discount rate
52 Week High:	$34.88
52 Week Low:	$24.25
Shares Outstanding (mil):	27.6
Market Capitalization (mil):	$921.8
Book Value/Share:	$2.69
Cash Per Share:	$5.14
Dividend (ann):	$0.00
Dividend Yield:	0.0%

General: Cash/diluted share 3Q14Efully diluted shares outstanding



Dec Yr	1Q	2Q	3Q	4Q	FY Rev	1Q	2Q	3Q	4Q	FY EPS	P/E
2013A	--	--	--	--	0.0	--	--	--	--	($1.92)	NM
2014E	0.0A	0.0	0.0	0.0	0.0	($0.35)A	($0.43)	($0.32)	($0.33)	($1.42)	NM
2015E	0.0	0.0	0.0	0.0	0.0	($0.43)	($0.51)	($0.56)	($0.61)	($2.11)	NM

Source: Company Information and Leerink Partners LLC Research
GAAP EPS.

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Sage Therapeutics, Inc. (SAGE): Initiating at OP, GABA Modulation Platform Charging Ahead in Status Epilepticus

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SAGE Therapeutics, Inc. Investment Thesis

- **We rate SAGE Shares Outperform.** SAGE Therapeutics (NASDAQ: SAGE) is a neuroscience company started by an experienced team of R&D leaders, CNS specialists, and investors focused on developing medicines to treat life-threatening, rare CNS disorders. SAGE's lead product, SAGE-547, is in clinical development for super-refractory status epilepticus (SRSE) and is the first of many compounds the company is developing in its epilepsy portfolio. SAGE-547 is a potent positive allosteric modulator of both synaptic and extra-synaptic $GABA_A$ receptors that rapidly advanced into Phase I/II clinical development in early 2014. The robust clinical potential of '547 was demonstrated under an emergency Investigational New Drug (IND) program in which 5 out of 6 SAGE-547-treated SRSE patients (each of whom had spent over 30 days in the ICU) were successfully weaned out of a medically induced coma. Preliminary results from the ongoing proof-of-concept study are equally encouraging, as thus far 4 out of 4 SAGE-547-treated SRSE patients have been weaned off anesthesia while on '547 therapy and 3 out of 4 did not require anesthesia again. Beyond '547, SAGE is developing a seizure franchise of advanced next generation compounds of novel $GABA_A$ allosteric modulators for the treatment of SE and other forms of seizure and epilepsy. SAGE-689 is currently in preclinical development for neuroanesthesia and status epilepticus and is expected to enter a Phase I trial in 2015. In addition, SAGE-217 is being developed as an intravenous therapy, as well as an oral step-down therapy for status epilepticus and other seizure disorders such as Dravet syndrome. With top-line Phase I/II '547 SRSE data expected before the end of 2014 and two additional compounds advancing into the clinic soon after, we believe SAGE shares are poised to appreciate as de-risking clinical catalysts are realized for the company's lead product and allosteric modulation platform.

DCF Analysis Implies ~50% Upside to the Stock in 12 Months

- **We model $1.3B in gross SAGE-547 revenues, which via a 75% probability of approval implies ~$1B in peak SAGE-547 revenues in 2023.** On a risk-adjusted basis, in 2023 we model ~$600MM in US revenues and ~$400MM ROW.
- For the pipeline (SAGE-689 and SAGE-217) we model ~$275MM in peak revenues in 2027 which could prove conservative if these products can match the efficacy of '547 in other areas of SE, which seems possible given that they operate via similar mechanisms-of-action.

Sum NPV FCF ($MM)	1123
Net Cash 3Q14E	142
Implied SAGE Mkt Cap ($MM)	**$ 1,265**
SAGE Per Share Value	**$ 45.83**

Cost of Equity	12%
TG Rate	3%
Diluted Shares Oustanding YE14	27.6

- We believe a premium valuation is warranted for SAGE shares based on a powerful platform of drugs validated by the "breakthrough-like" clinical results seen to date, where a very heterogeneous group of extremely sick SRSE patients were essentially "brought back to life."

SAGE DCF Analysis	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	TV
Cash Flow From Operations ($MM)	(28)	(51)	(67)	(70)	(35)	55	184	287	397	528	469	443	439	316	207	139	77	
Cash Flow From Investing ($MM)	(0)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	
Net Borrowing (Repayment) ($MM)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Free Cash Flow ($MM)	(28)	(51)	(68)	(72)	(38)	51	179	281	390	520	460	434	430	307	198	130	68	783
Discount Periods	-	0.50	1.50	2.50	3.50	4.50	5.50	6.50	7.50	8.50	9.50	10.50	11.50	12.50	13.50	14.50	15.50	
NPV FCF ($MM)	(14)	(49)	(57)	(54)	(25)	31	96	135	167	199	157	132	117	74	43	25	12	135

Source: SEC filings and Leerink Partners Research

SAGE-547 Is an Allosteric Modulator of $GABA_A$ With a Novel Mechanism of Action

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- **SAGE-547 is SAGE's proprietary formulation of allopregnanolone**, a known metabolite of progesterone that is naturally formed in the CNS in humans.
- **'547 is an allosteric modulator of both synaptic and extra-synaptic $GABA_A$ receptors, which are the primary inhibitory neurotransmitters in the central nervous system**. GABA is widely regarded as a validated drug target for a variety of CNS disorders, with decades of research and multiple approved drugs targeting these systems.
- **However, traditional approaches of inhibiting or activating the GABA pathway via synaptic sites only (i.e., benzodiazepines) have been associated with significant toxicities and diminishing efficacy in status epilepticus as disease becomes more refractory.**
  - as SE progresses in many patients, select synaptic $GABA_A$ receptors are down-regulated or removed from the neuronal synaptic surface.
  - As a result, drugs that target down-regulated receptors, such as benzodiazepines, often are not effective in stopping SE, especially RSE or SRSE.

Source: SEC filings

SAGE-547 Is an Allosteric Modulator of $GABA_A$ With a Novel Mechanism of Action (cont'd.)

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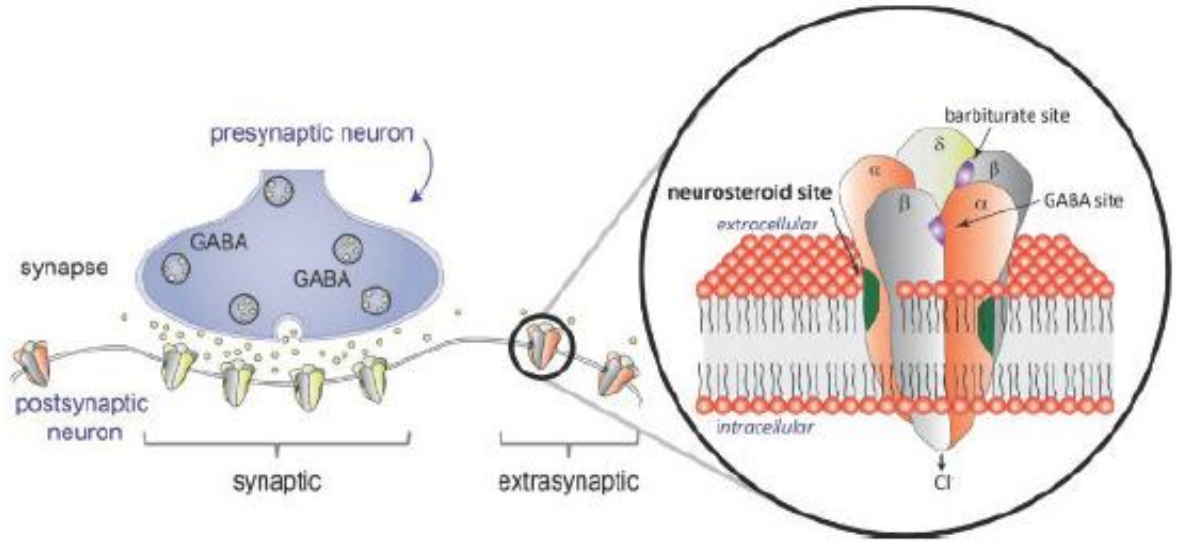
- **Data generated to date show that SAGE-547 may have a unique anticonvulsive role in the treatment of status epilepticus,** which could either be superior to that of benzodiazepines (BDZs), or at the very least uniquely effective in cases where benzodiazepines fail to incur seizure control.
  - In all 10 cases in which '547 has been examined, treated patients failed benzodiazepines, anticonvulsants, and anesthesia before receiving SAGE-547.
  - Pre-clinical studies further support SAGE-547's efficacy and corroborate the "extra-synaptic" $GABA_A$ hypothesis, as SAGE-547 has demonstrated animal model activity in seizures that are resistant to BDZs. Mouse models of have shown that relatively speaking, extra-synaptic $GABA_A$ appears more accessible than synaptic $GABA_A$ in an SRSE setting.

Diagram of a Synapse and Extrasynaptic Receptor Sites



Shown on the right, while not found directly in the synapse, extrasynaptic receptors still play a role in neuronal transmission and are relevant in the release or inhibition of $GABA_A$.

Source: Company slides

Preliminary Data Imply SAGE-547 Has Robust Clinical Potential in SRSE – Emergency Use INDs

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Patient	#1	#2	#3	#4	#5	#6
Age / Sex	23 / Male	11 / Female	28 / Male	2 / Female	17 months / Male	14 / Female
ICU Duration	>90 days	>60 days	>60 days	>30 days	>30 days	>30 days
Failed MultipleWeaning Attempts	Yes	Yes	Yes	Yes	Yes	Yes
Etiology	Unknown	Autoimmune (anti-Thyroid/ anti-GAD)	Unknown	Presumed Metabolic Disorder	Presumed Metabolic Disorder	Progressive Myoclonic Epileptic Encephalopathy
Drug-related SAEs	None	None	None	None	None	None
Steady-State Plasma Levels > 80nM	Yes	Yes	Yes	Yes	No	Yes
SE Resolved	Yes	Yes	Yes	Yes	No	Yes
Time from Discontinuation of SAGE-547 to Resolution of SRSE	Concurrent	Concurrent	3 days	Concurrent	N/A	3 days

- Under emergency treatment INDs, 6 SRSE patients were treated with SAGE-547, each suffering from status driven by different etiologies. **All patients had spent at least 30 days in the ICU before receiving ’547.**
- **Shown in the table above, 5 out of 6 of these patients were cured of their SRSE, 3 while on SAGE-547, and 2 others a few days after stopping SAGE-547 therapy.**

Source: SEC filings

Early Returns from the Phase I/II Trial Further Validate Effect Seen in Emergency INDs

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Patient	#1	#2	#3	#4
Age / Sex	65 / Male	14*/ Female	33 / Female	36 / Male
ICU Duration	12 days	11 days	21 days	4 days
Failed One or More Weaning Attempts	Yes	Yes	Yes	Yes
Etiology	Subdural Hematoma	Landau-Kleffner Syndrome	HIV / Toxoplasmosis	Seizure Disorder/ Pneumonia
Drug-related Serious Adverse Event	None	None	None	None
Steady-State Plasma Levels > 80nM	Yes	Yes	Yes	Data pending
Key Efficacy Endpoint Met	Yes	Yes	Yes	Yes

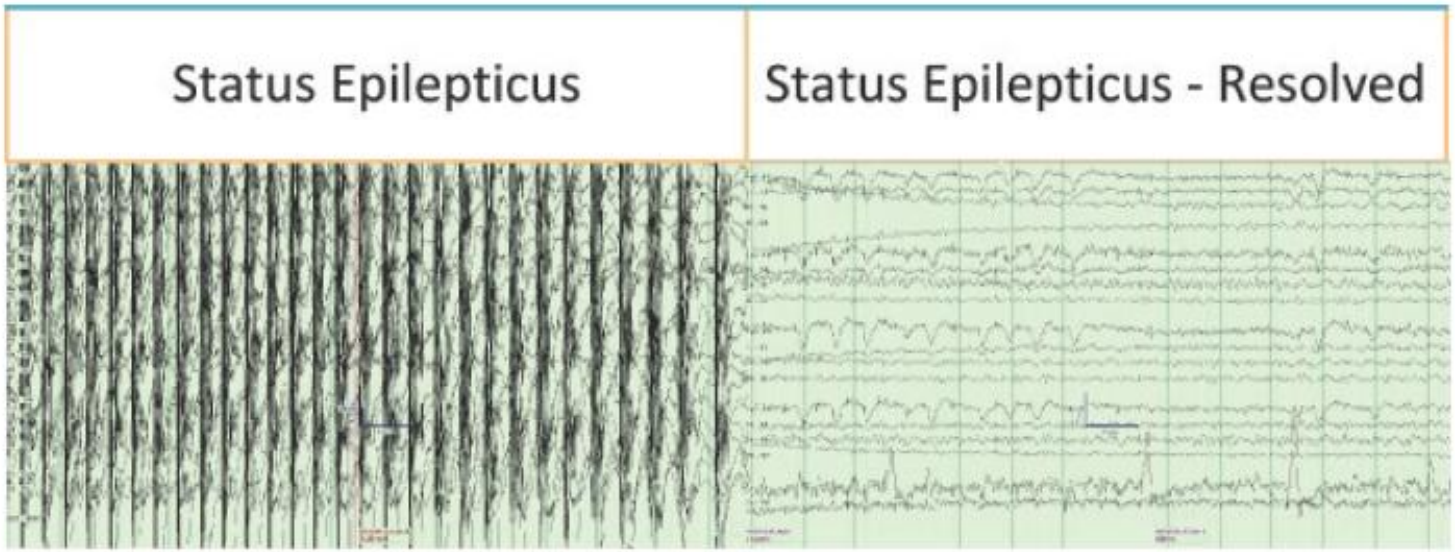
- After producing highly encouraging data in the emergency IND program, SAGE-547 was rapidly advanced into an open-label Phase I/II trial in which at least 10 SRSE patients will be treated.
- **Thus far, 4/4 patients who have received ’547 were each successfully weaned off of his/her anesthetic agent while SAGE-547 was being administered.**
- **Three of these patients were subsequently weaned of ’547 without reinstating general anesthesia**, while one patient experienced recurrence of SE on withdrawal of SAGE-547 and required anesthesia again.

Source: SEC filings

Status Epilepticus Is a Very Serious Medical Emergency

- **Status epilepticus (SE) is a life-threatening, urgent neurologic disorder that affects ~150,000 people per year in the US.**
- SE is essentially an acute, prolonged epileptic crisis (greater than 5 minutes), and can stem from a pre-existing seizure disorder, injury, infection, or various other etiologies.
- When an SE crisis occurs, a patient is first treated with intravenous benzodiazepines. If this is unsuccessful, the patient is then admitted into the hospital where anti-epileptic drugs and then (if necessary) anesthesia are used in an attempt to stop the seizure.
- **There are no approved treatments for status epilepticus, and an estimated 30,000 individuals die from SE in the US each year.** SAGE estimates that the hospitalization of ~35K SE patients in the ICU each year results in an overall cost of $3.8B-$7.0B in the US.

Sample Status Epilepticus EEG Shows Excessive Synchronous Neuronal Activity During SE Crisis



Source: SEC filings

Defining "Super Refractory" Status Epilepticus (SRSE), '547's Lead Indication

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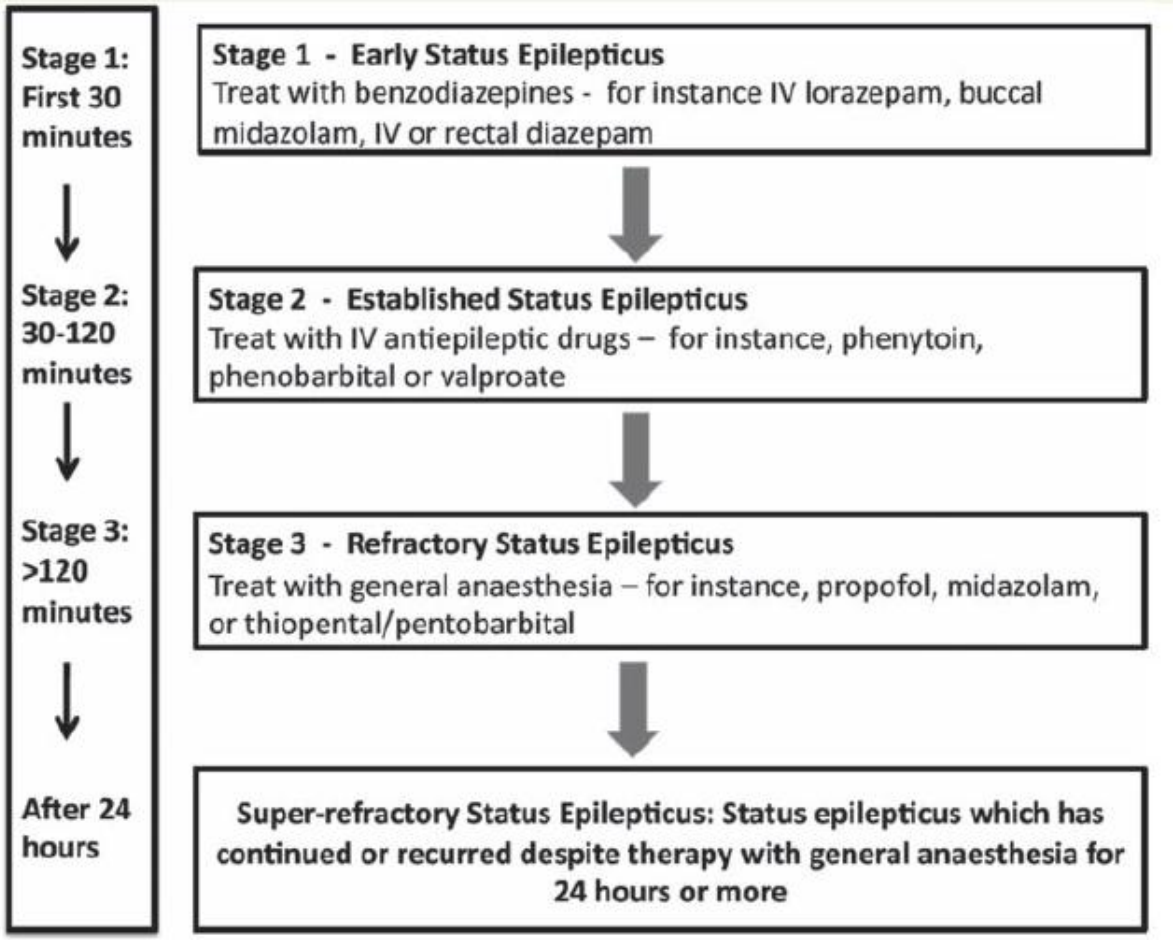
- **The concept of super refractory status is defined by progressive treatment failures to first, second and third-line SE therapies.**
- Shown on the right, when patients first present with early SE, they are administered benzodiazepines. Often times this is done at home by a medical team, and if successful the patient may not need to be hospitalized.
- However, if benzodiazepines fail to halt the seizure, a patient is brought into the hospital where he or she is treated with intravenously administered antiepileptic drugs (AEDS). **If a patients' SE does not abate after AED treatment, he or she is then characterized as "Refractory."**
- Once a patient has RSE, treatment becomes more challenging, and anesthesia is often used to induce a medical coma. The hope is that by radically decreasing brain activity the SE positive feedback loop will be broken, allowing the patient to be "weaned" off anesthesia in a non-SE state.
- **If anesthesia fails to stop an RSE episode after 24 hours of treatment, a patient who was once just "refractory" is then characterized as "super refractory."**



Source: "Brain," A Journal of Neurology

SRSE Outcomes Are Generally Very Poor…

- …**rendering us confident that the SAGE-547 drug effect demonstrated in an open-label setting is real and robust.** Around half of SRSE cases occur in patients without any history of seizures, and SAGE-547 has demonstrated robust responses in new onset RSE as well as patients with pre-existing underlying seizure disorders.

- **SAGE estimates that the cure rate for refractory status is ~35%,** and this number is likely lower in super refractory status where SAGE-547 has shown its robust benefits.

- **Thus, we believe that as more patients are treated in the ongoing open label trial, a 70% success rate for SAGE-547 in SRSE would be very encouraging** (~2x what would be expected by the standard-of-care), while maintaining an 80-90% success rate would imply that SAGE-547 could be a strong candidate for Breakthrough Therapy status.

- **An estimated 20k patients die from SE each year in the US.**

Source: SEC filings

In the US Alone SRSE Presents >$1B Market Opportunity, We Believe

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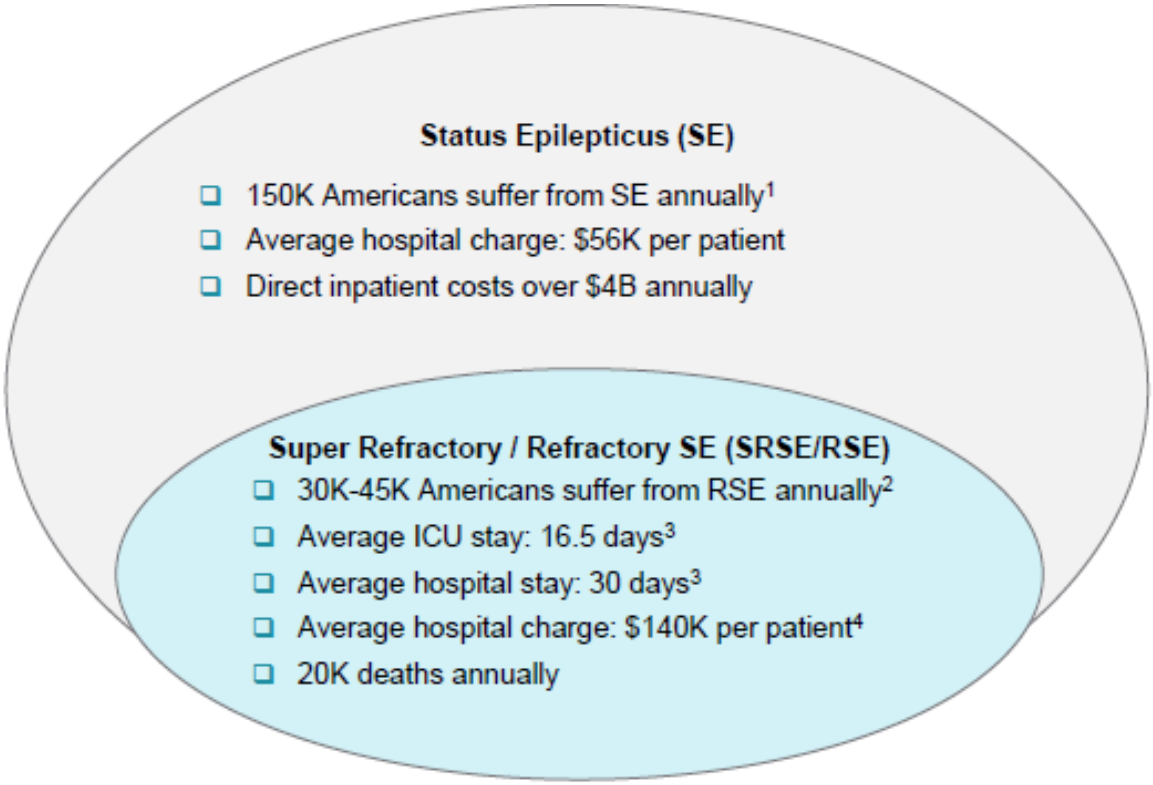
- **There are currently no approved treatments for SE. For SRSE, current approaches are largely experimental and associated with poor outcomes.**
  - Putting patients in a medically induced coma can lead to significant brain damage, and is only effective in a minority of cases, which underscores the high demand for more effective neuroanesthesia and weaning agents.
- **The prevalence and pharmacoeconomics of SRSE (25,000 patients in the US) lends itself to premium pricing for SAGE-547.** Drugs for comparably prevalent diseases, such as inhalants for the broad cystic fibrosis (CF) indication cost >$50,000. However, these drugs are not disease modifying, and pulmonary infections in CF are rarely as grave a concern as SRSE. In addition, shown on the right, the average hospital charge for an SE patient is >$50K, while the average charge for a RSE or SRSE patient is almost $150K.



At our base case cost of $60K/year, the US SRSE market presents an ~$1.3B opportunity to SAGE. Upside to this estimate could come from ’547 use in the RSE market, which could add another ~$800MM or so to the revenue opportunity, depending on the estimates one uses.

Source: Company slides

Few Other Treatments for Status Epilepticus in Development

- **Other than SAGE-547, ongoing studies in status and RSE are generally focusing on therapies that are already utilized in the clinic, so we do not expect any major competitive threats to arise.** On clinicaltrials.gov, studies are ongoing examining propofol, valproic acid, ketogenic diet, and various other already-approved anti-epileptic drugs (AEDs).

- **A few other compounds in development target $GABA_A$, though their utility in status epilepticus is unclear,** and their use could be blocked by orphan drug exclusivity if these companies ever attempt to pursue development in SRSE and SAGE gets to market first.
  - Upsher-Smith's $GABA_A$-targeting USL261 is in Phase III development for seizure clusters, but it is administered via a nasal spray so it might need to be reformulated in order to be useful in SRSE.
  - Marinus's $GABA_A$-targeting Ganaxolone is in various studies including a trial in adults with partial onset seizures, but is administered orally, so it also would most likely need to be reformulated for use in SRSE.

Source: Nature Reviews

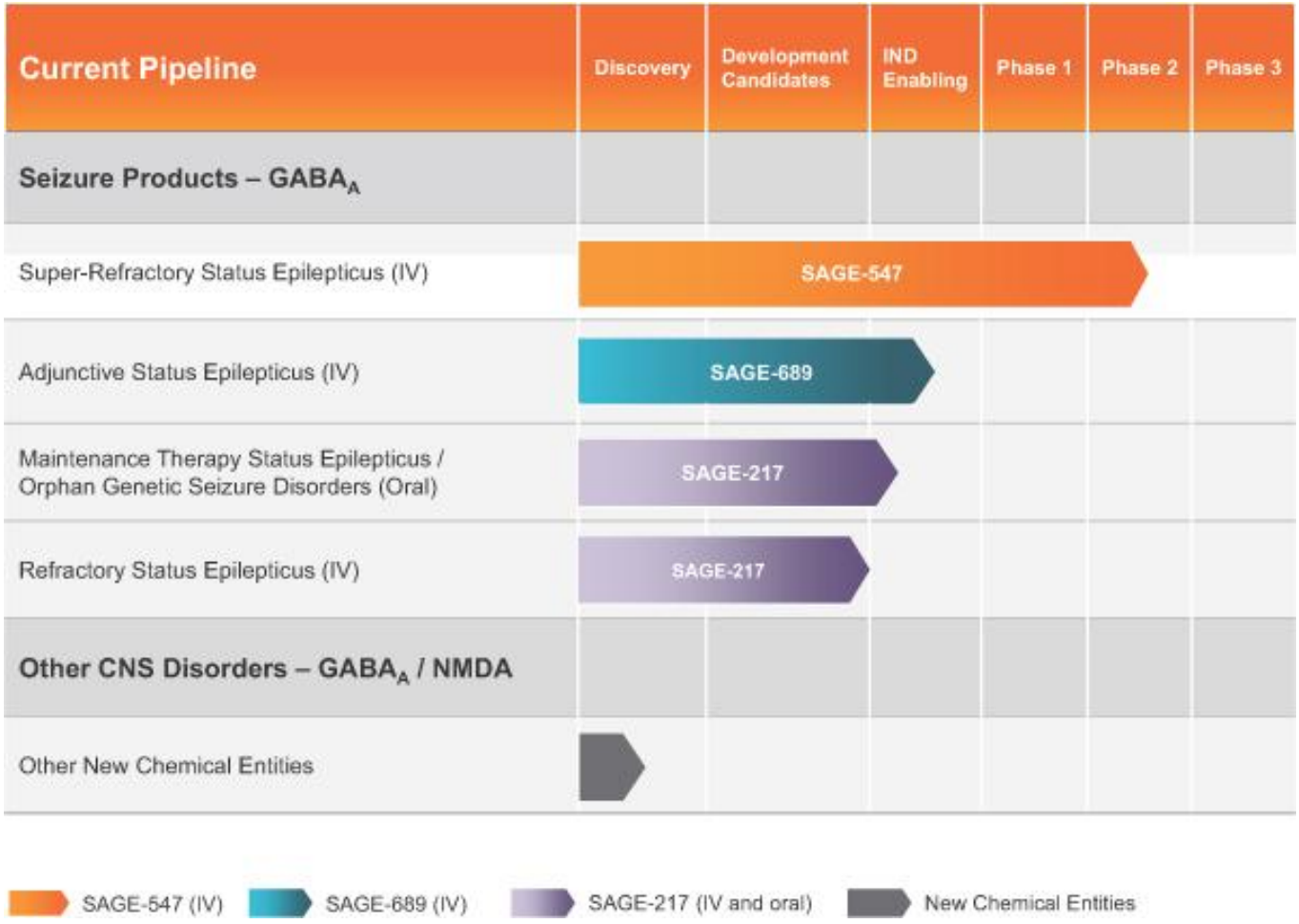
SAGE-547 Phase I/II Study Ongoing: Data Expected by YE14

- The SAGE-547 Phase I/II clinical trial is an open-label study designed to evaluate the safety, tolerability, and efficacy of SAGE-547 in at least 10 adult patients diagnosed with SRSE and is currently enrolling patients at five centers across the U.S. The trial is expected to enroll 10 to 15 adult patients with SRSE who have not responded to conventional therapy with continuous intravenous antiepileptic agents and who remain in a state of persistent seizure following one or more weaning attempts from anesthesia. In the study, SAGE-547's safety, exposure, and ability to effectively halt SRSE will all be evaluated. Patients will be administered SAGE-547 intravenously for five days while weaning from anesthesia is attempted and will be monitored for four weeks following treatment.
- **Efficacy endpoints include: the ability of a patient to be weaned off anesthesia while receiving SAGE-547 as well as the duration of patients' response to treatment.**

Source: SEC filings

As SAGE-547 Advances, Follow-On Compounds Close Behind

- **SAGE-547 is the most advanced product in SAGE's pipeline and is expected to produce Phase I/II SRSE data in 2H14, after which it will be advanced into a pivotal Phase III.**
- Meanwhile, follow-on product candidates, SAGE-689 and SAGE-217, utilize similar mechanistic pathways as SAGE-547 and are designed to have pharmaceutical properties which optimize their clinical profiles for the treatment of different stages of SE.



-SAGE plans on filing an IND for '689 in 2015 and will initiate a clinical trial soon thereafter
-SAGE plans to file an IND for '217 in 1H15 and start a Phase I trial soon thereafter

Source: SEC filings

Upcoming Milestones in the Next 12 Months

Product	Event	Timing
SAGE-547	Top-line Phase I/II Data	2H14
SAGE-547	Initiate Pivotal Trials	2015
SAGE-689	Initiate Phase I Studies	2H14/1H15
SAGE-217	Initiate Phase I Studies	2015

Source: SEC Filings and Leerink Partners Research

Experienced Management Team Well-Suited to Create Shareholder Value

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Team Member	Background
Jeffrey Jonas, M.D.; CEO	Jeffrey Jonas joined SAGE Therapeutics as CEO in 2013 and has more than 20 years of experience on both the scientific and business sides of the pharmaceutical and healthcare industries, particularly in the CNS field. Before joining the SAGE team, Dr. Jonas served as the President of the Regenerative Medicine Division of Shire plc and previously as Senior Vice President of Research and Development, Pharmaceuticals at Shire. Prior to Shire, he served as the Executive Vice President of ISIS Pharmaceuticals, as the Chief Medical Officer and Executive Vice President of Forest Laboratories, Inc. and in senior-level positions at Upjohn Laboratories. Dr. Jonas founded AVAX Technologies, where he served as CEO and President, and SCEPTOR Industries, where he served as Chairman, President and Chief Technology Officer.
Stephen Kanes, M.D., Ph. D; CMO	Stephen Kanes joined SAGE Therapeutics as CMO in 2013. Dr. Kanes is a former practicing psychiatrist and previously served as the Executive Director/Therapeutic Area Clinical Director for the inflammation, neuroscience and respiratory GMED Division of AstraZeneca Pharmaceuticals. At AstraZeneca, he also served as the Chair of the neuroscience safety knowledge group. During his time at AstraZeneca, Dr. Kanes served as the Medical Science Senior Director for the neuroscience established brands and emerging anesthesia Group Product Team and in other positions of increasing responsibility in the Neuroscience Discovery Medicine, early and late development groups. Prior to joining AstraZeneca, he was a faculty member in the Psychiatry Department at the University of Pennsylvania School of Medicine where he continues to serve as an adjunct Assistant Professor of psychiatry. Dr. Kanes has authored or co-authored more than 30 peer-reviewed publications. He serves as an ad hoc reviewer for the journals Neuropsychopharmacology, American Journal of Medical Genetics, and Biological Psychiatry.
Albert Robichaud, Ph. D; CSO	Albert J. Robichaud joined SAGE Therapeutics as CSO in 2011, with more than 20 years of drug discovery experience focused primarily in the neuroscience arena. Most recently, he was Vice President of Chemistry and Pharmacokinetic Sciences at Lundbeck USA, where he was responsible for the drug discovery, analytical, computational and pharmacokinetics departments focused on synaptic transmission and neuroinflammation. Prior to Lundbeck, Dr. Robichaud was Senior Director and Head of the Neuroscience Discovery Chemistry department of Wyeth Research. During his tenure there, his group successfully delivered more than 15 drug candidates into clinical development in a broad range of neuroscience indications. Dr. Robichaud has co-authored more than 125 manuscripts and abstracts, and is a co-inventor on 45 patents and patent applications.
Kimi Iguchi, CFO	Kimi Iguchi joined SAGE Therapeutics as CFO in 2013, bringing both financial and operating strength from her senior management experience at Millennium, Biogen and emerging life science companies. Prior to joining SAGE, Ms. Iguchi served as the Chief Operating Officer, North America, for Santhera Pharmaceuticals. Prior to that, she held the role of Vice President of Finance at Cyberkinetics Neurotechnology Systems. Previously, Ms. Iguchi was the Senior Director of Financial Reporting and Analysis at Millennium Pharmaceuticals and the Senior Manager External Reporting at Biogen, Inc. She also worked as a business assurance manager at PricewaterhouseCoopers LLP and started her career in chemistry-related positions at various Boston-based companies.

Source: Company website

Digging Into the Underlying Logic of '547: The Importance of GABA and Extra-Synaptic Receptors

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- **GABA (y-Aminobutyric acid) is the major inhibitory neurotransmitter in the CNS and mediates downstream neurologic and bodily function via activation of $GABA_A$ receptors.**
  - GABA calms nerve activity in the brain and as a supplement is sold and promoted as a natural tranquilizer.
- **Benzodiazepines work by enhancing the effect of GABA at the $GABA_A$ receptor, resulting in sedative, hypnotic, anxiolytic, anticonvulsant, and muscle relaxant properties.** These properties render benzodiazepines an effective first-line agent for status, during which brain activity becomes locked in a self-perpetuating positive feedback loop, leading to uncontrollable long seizures.
- **However, as status epilepticus progresses, the $GABA_A$ receptors on which benzos exert their effect ("synaptic" receptors) become internalized, rendering benzodiazepines less effective in RSE and SRSE.**

Source: Company slides

Digging Into the Underlying Logic of '547: The Importance of GABA and Extra-Synaptic Receptors (cont'd.)

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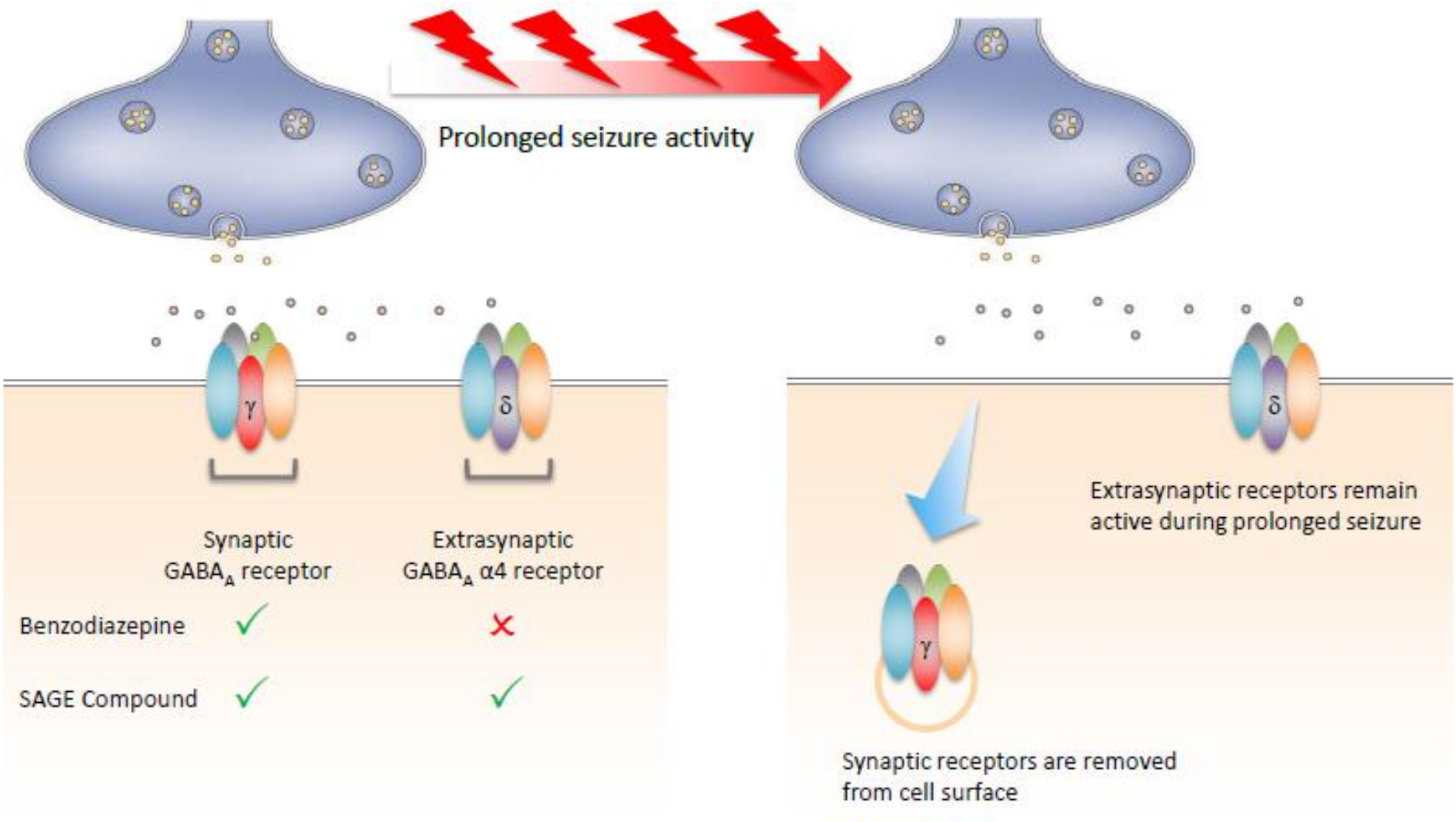

Source: Company slides

Preclinical Data Show Up-regulation of Extra-Synaptic Receptors in RSE, Effectiveness of '547

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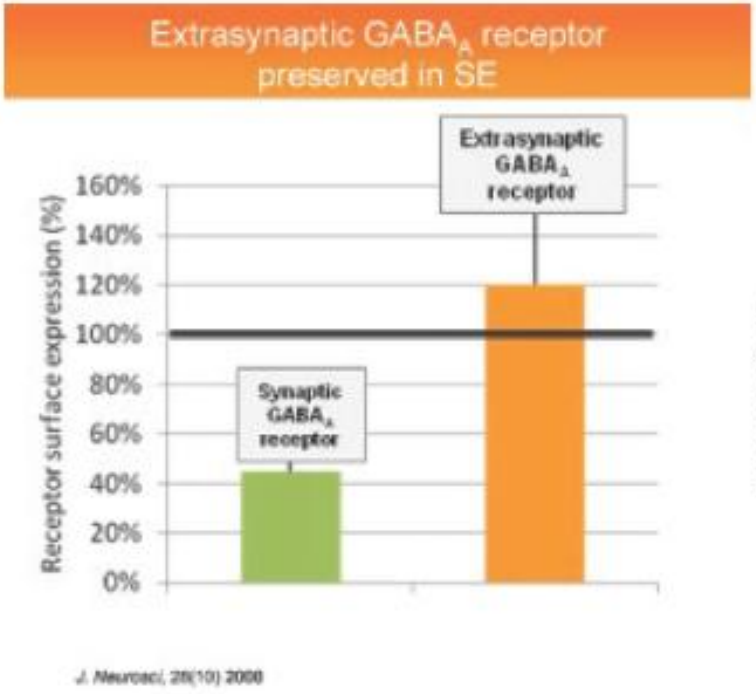
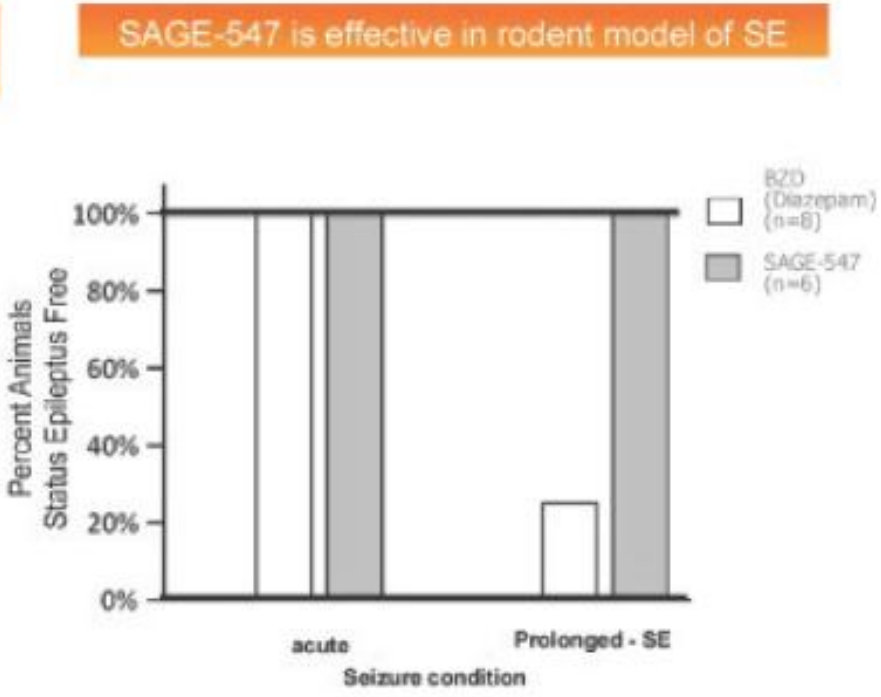
- Published non-clinical testing, utilizing well-validated animal models of SE and sophisticated instruments for identifying the expression of both synaptic and extrasynaptic $GABA_A$ receptors on the surface of neurons, supports SAGE's synaptic/extra-synaptic receptor hypothesis. These studies, performed in rats, demonstrate the reduced number and activity of synaptic $GABA_A$ receptors during SE, in contrast to the preserved number and activity of extrasynaptic $GABA_A$ receptors under the same conditions. These studies were done by measuring the amount of $GABA_A$ synaptic and $GABA_A$ extrasynaptic receptors that are present on the surface of the neurons. The analysis of protein present for each of the respective receptors in animals in the SE-state, versus normal animals, shows the difference in $GABA_A$ receptor expression.
- We believe animal models of seizure also portray the advantages of SAGE's allosteric approach over therapy with BDZs. The following figure shows the results of a rodent study where the subject animals were placed into an SE-like condition of prolonged seizure resulting in continuous spontaneous seizures. SAGE-547 was then administered to certain animals while the others received a BDZ. The results demonstrate that BDZs are unable to adequately control the seizure condition that could be due to down-regulation of synaptic $GABA_A$ receptors. In contrast, SAGE-547, working at both synaptic and extra-synaptic $GABA_A$ receptors, appears to have treated the seizures in these animals and resolved their SE.





Source: Company slides

Emergency IND Case Studies Supportive of SAGE-547 Drug Effect: Patient #1

LEERINK

- Patient #1 was a previously healthy 23 year old male who began treatment with an earlier formulation of SAGE-547 on his 92nd day of SRSE of unknown etiology.
- Although burst suppression was achieved with anesthetic agents, repeated attempts at weaning were unsuccessful. The patient had been previously treated with approximately 20 standard and alternative treatment regimens prior to initiation of SAGE-547.
- At the time of SAGE-547 treatment, the patient was also being treated with lacosamide, phenobarbital, clonazepam, levatiracitam, bromides, and a ketogenic diet. Treatment with these medications preceded SAGE-547 administration and were not able to control SRSE in this patient.
- **Following the initiation of SAGE-547 treatment, normalization of his EEG occurred over the next 48-72 hours and he was successfully weaned from his medically induced coma. The patient continued to improve and was discharged to a rehabilitation facility and then to home.**

Source: SEC filings

Emergency IND Case Studies Supportive of SAGE-547 Drug Effect: Patient #2

LEERINK

- Patient #2 was a previously healthy 11 year old female treated with SAGE-547 on her 52nd day of SRSE, likely of autoimmune origin.
- This patient had received pentobarbital either alone, or in combination with ketamine, hypothermia, midazolam and magnesium, to achieve burst suppression. This patient also was treated with various anti-seizure drugs, including phenobarbital, valproate, phenytoin, fos-phenytoin, topiramate, locosamide, and levetiracetam along with a ketogenic diet, either alone or in combination, and other drugs targeting the presumed underlying etiology, including methylprednisolone, plasmapheresis, intravenous immune globulin, rituximab, and cyclophosphamide.
- **Despite this aggressive therapy, the patient was unable to wean from burst suppression without recurrence of seizure activity.**
- At the time of SAGE-547 administration, the patient was maintained in burst suppression with a continuous pentobarbital infusion and was being treated with felbamate, phenytoin, phenobarbital, and a ketogenic diet. On the second day of SAGE-547 administration, a taper of pentobarbital was initiated, and on the fifth day of SAGE-547 administration, pentobarbital was successfully weaned and SAGE-547 infusion was stopped. Initially, the patient continued to have brief, focal seizures, but not SE. The patient's seizure burden, as compared to previous reductions with pentobarbital, was significantly reduced to two to three seizures per day.
- **One week following treatment with SAGE-547, the patient was awake and following commands. The patient is continuing to recover and is expected to restart school in fall 2014.**

Source: SEC filings

Emergency IND Case Studies Supportive of SAGE-547 Drug Effect: Patient #3

LEERINK

- Patient #3 was a previously healthy 28 year old male who was admitted to the ICU after a generalized tonic-clonic seizure at home. Initially, he had depressed mental status accompanied by intermittent right and left temporal seizures.
- **Over the next two weeks, his EEG progressed to SE. Although burst suppression was established with a combination of pentobarbital and ketamine, repeated attempts at weaning were unsuccessful.**
- At the time of SAGE-547 administration, the patient was also being treated with phenytoin, lacosamide, valproate, pregabalin, pyridoxine, magnesium, IV immunoglobulin, and steroids. Immediately prior to administration of SAGE-547, the patient developed presumed sepsis, likely due to ongoing anesthesia and intubation, and was withdrawn from pentobarbital as SAGE-547 was initiated.
- **Over the five days of SAGE-547 infusion, EEG activity improved and continued to improve over an additional three-day period after the discontinuation of SAGE-547.** Ultimately, this patient's seizures were controlled with a combination of oral anti-seizure medications and he was transferred to a step-down unit for continued recovery and rehabilitation. Similar to the first patient, there were no adverse events attributable to SAGE-547 treatment.

Source: SEC filings

Emergency IND Case Studies Supportive of SAGE-547 Drug Effect: Patient #4

LEERINK

- Patient #4 was a two year old female with a two-month history of epilepsy who presented with SE of unknown etiology.
- The patient received initial therapy with levetiracetam and phenobarbital, and subsequent treatments with pyridoxine, methylprednisolone, benzodiazepine, propofol, and midazolam. Burst suppression was successfully achieved with midazolam and pentobarbital treatment.
- At the time of SAGE-547 administration, the patient was also being treated with pentobarbital, midazolam, phenobarbital, levetiraceta, and dopamine.
- **Within 24 hours of SAGE-547 administration, the patient was successfully tapered off midazolam and pentobarbital was reduced.** The patient was found to have significant brain atrophy on a follow-up magnetic resonance imaging scan, which was thought to be due to her underlying condition with no definitive diagnosis. **At the end of SAGE-547 administration, the patient was no longer in SE.**

Source: SEC filings

Emergency IND Case Studies Supportive of SAGE-547 Drug Effect: Patient #5

LEERINK

- Patient #5 was a previously healthy 17 month old male who initially presented with complex febrile seizures progressing to RSE of unclear origin.
- The seizures continued despite increasing doses of midazolam, phenobarbital, levetiracetam, and lorazepam and a maintenance dose of levetiracetam 50 mg/kg twice a day. The patient had both clinical and subclinical seizures by EEG and was started on a midazolam infusion. As he continued to have seizures, a pentobarbital infusion was also added. Additional treatments included solumedrol 30 mg/kg/day for five carnitine, coenzyme Q10, and riboflavin. **Despite adequate pentobarbital levels, breakthrough seizures continued.**
- **SAGE-547 was administered for five days with a dosing scheme based on extrapolation from adult dosing. SAGE-547 was not able to halt SE in this patient, but plasma levels of SAGE-547 achieved using this dosing scheme were substantially below SAGE's target level of 150nM.** After starting SAGE-547, a midazolam wean was attempted. The patient experienced recurrence of seizures at that time and midazolam was re-titrated to control seizures. **There were no drug-related adverse events reported.**

Source: SEC filings

Emergency IND Case Studies Supportive of SAGE-547 Drug Effect: Patient #6

LEERINK

- Patient #6 was a 14 year old female with a history of progressive myoclonic epileptic encephalopathy and previous episodes of RSE that had responded to pentobarbital or midazolam.
- She presented again with SE and was treated with IV midazolam along with maximal doses of ethosuximide, levetiracetam, clobazam, and a ketogenic diet and had failed multiple midazolam weans. She was then treated with pentobarbital combined with midazolam to achieve burst suppression.
- **Despite intensive treatment, she continued to have intractable focal myoclonic seizures.**
- SAGE-547 was administered for five days. Initially, she was unable to be weaned off of midazolam and pentobarbital, but one day after completing SAGE-547 administration she was successfully weaned off of both midazolam and pentobarbital. **By the third day following SAGE-547 treatment, the patient was no longer in SRSE.** Her EEG is normalizing and she is beginning to respond to simple commands.

Source: SEC filings

Emergency IND Program – Key Takeaways

- **After receiving SAGE-547, 5/6 patients no longer had status epilepticus within 3 days after terminating therapy.**

- SAGE-547 was administered to a very serious population of super refractory status patients, all of whom had spent at least 30 days in the intensive care unit before receiving ’547 therapy.

- In addition, the etiology of SRSE in these patients was very heterogeneous, increasing our confidence that ’547 could be effective in SE from various origins.

- As the Phase I/II proof-of-concept trial began rapidly, we believe the FDA recognizes the significant unmet need presented by SRSE and the encouraging signal observed with ’547 treatment.

Source: Company slides

Early Returns from the Phase I/II Consistent w/ Robust Effect Seen in INDs

LEERINK

- **Thus far, in the Phase I/II, all 4 patients evaluated have been able to be weaned off anesthesia while receiving SAGE-547,** while 3 of these patients did not need anesthesia again and thus demonstrated a sustained ’547 response with no more SE.
- **As in the emergency IND study, the etiologies of SRSE in the treated patients all seemed to differ.**

Preliminary Phase I/II SAGE-547 Data: Initial 4 Patients of Efficacy Data Appear Encouraging, In Our View

Patient	#1	#2	#3	#4
Age / Sex	65 / Male	14*/ Female	33 / Female	36 / Male
ICU Duration	12 days	11 days	21 days	4 days
Failed One or More Weaning Attempts	Yes	Yes	Yes	Yes
Etiology	Subdural Hematoma	Landau-Kleffner Syndrome	HIV / Toxoplasmosis	Seizure Disorder/ Pneumonia
Drug-related Serious Adverse Event	None	None	None	None
Steady-State Plasma Levels > 80nM	Yes	Yes	Yes	Data pending
Key Efficacy Endpoint Met	Yes	Yes	Yes	Yes

Source: Company slides

SAGE-547 Revenue Model in SRSE – Key Assumptions

- Per SAGE company estimates as well as information gleaned from various published papers on SE, we estimate that there are 150,000 status epilepticus patients per year in the US, ~25,000 of whom become super refractory.
- We estimate that 67% of patients are controlled by BDZs, 30% of 2nd-line patients are controlled by AEDs, and that anesthesia is effective on its first weaning attempt in ~30% of RSE patients. This leaves 25,000 SAGE-547 candidates in the US per year.
- **At peak, we assume that 50% of the 25k super refractory status patients are treated with SAGE-547,** while any SAGE-547 penetration into RSE presents upside to our estimates.
- **We assume a $60k/year cost given that SAGE's customers will be hospitals who are more cost conscious,** but believe this could be conservative given that the high cost of SRSE patients could be supportive of a higher '547 price if future data readouts are as compelling as the emergency IND results and the early returns from the Phase I/II.
- **We solely assume that SAGE-547 is protected by 7 years of orphan drug exclusivity in the US and 10 in Europe,** and after our peak US/EU sales years of 2023/2026 we model a ~-40% growth rate as we assume the emergence of competition and/or generics.

Source: Leerink Partners Research and SEC filings

SAGE-547 Revenue Model: ~$1B in Peak Risk-Adjusted Sales in 2023E

LEERINK

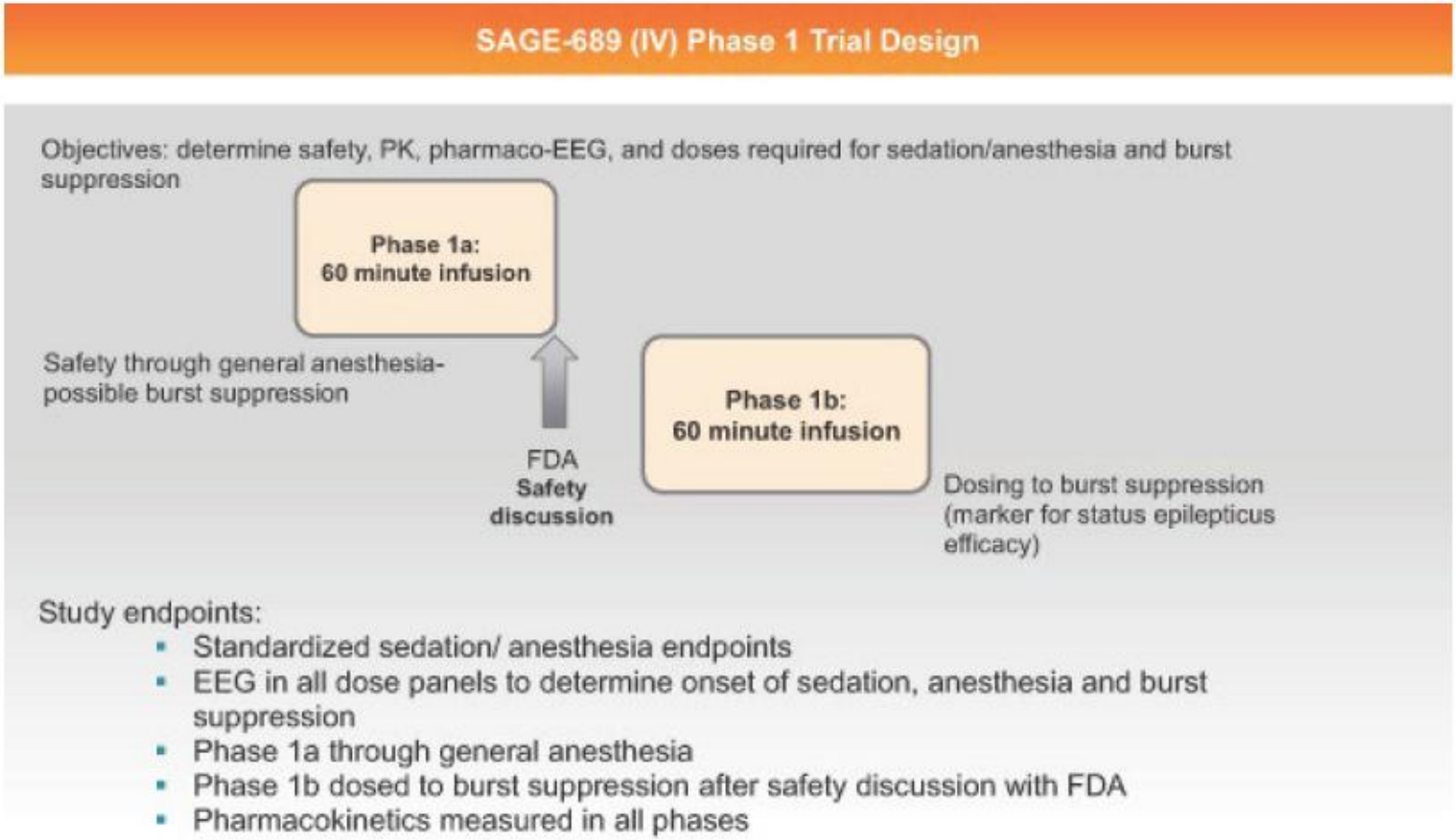
SAGE-547 SRSE Revenue Model	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
US Status Epelepticus Patients	150,000	151,350	152,712	154,087	155,473	156,873	158,284	159,709	161,146	162,597	164,060	165,537	167,026	168,530	170,046	171,577	173,121
% refractory to benzodiazepines	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
Second-Line Status Epelepticus Patients	50,000	50,450	50,904	51,362	51,824	52,291	52,761	53,236	53,715	54,199	54,687	55,179	55,675	56,177	56,682	57,192	57,707
% refractory to AEDs	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%
Refractory Status Epelepticus (RSE) Patients	35,000	35,315	35,633	35,954	36,277	36,604	36,933	37,265	37,601	37,939	38,281	38,625	38,973	39,324	39,678	40,035	40,395
% super refractory - 1 failed wean attempt	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%
Super RSE Patients	25,000	25,225	25,452	25,681	25,912	26,145	26,381	26,618	26,858	27,099	27,343	27,589	27,838	28,088	28,341	28,596	28,854
%RSE treated with SAGE-547	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
%SRSE treated with SAGE-547	0.0%	0.0%	0.0%	1.5%	5.0%	10.0%	20.0%	30.0%	40.0%	50.0%	25.0%	12.5%	6.3%	0.3%	0.3%	0.3%	0.3%
Patients on SAGE-547	-	-	-	385	1,296	2,615	5,276	7,985	10,743	13,550	6,836	3,449	1,740	84	85	86	87
Annual Cost of Therapy	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000
US Gross Revenues ($MM)	0	0	0.0	23.1	77.7	156.9	316.6	479.1	644.6	813.0	410.2	206.9	104.4	5.1	5.1	5.1	5.2
Approval Probability	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
US Probability-Weighted Revenues ($MM)	**0**	**0**	**0.0**	**17.3**	**58.3**	**117.7**	**237.4**	**359.3**	**483.4**	**609.7**	**307.6**	**155.2**	**78.3**	**3.8**	**3.8**	**3.9**	**3.9**
ROW as % of US	0%	0%	0%	10%	25%	35%	45%	55%	60%	65%	151%	344%	770%	7946%	3937%	1951%	967%
SAGE-547 ROW Gross Revenues ($MM)	-	-	-	2	19	55	142	264	387	528	618	711	803	402	201	100	50
SAGE-547 ROW p(w) Revenues ($MM)	**0**	**0**	**0**	**1.7**	**14.6**	**41.2**	**106.8**	**197.6**	**290.1**	**396.3**	**463.7**	**533.3**	**602.6**	**301.3**	**150.6**	**75.3**	**37.7**
y/y Growth Rate						283%	259%	185%	147%	137%	17.0%	15.0%	13.0%	-50.0%	-50.0%	-50.0%	-50.0%
	-	-	-	25.4	97.2	211.8	459.0	742.6	1,031.3	1,341.4	1,028.4	917.9	907.8	406.8	206.0	105.6	55.4
SAGE-547 WW P(w) Revenues	**0**	**0**	**0**	**19.1**	**72.9**	**158.8**	**344.3**	**557.0**	**773.5**	**1006.1**	**771.3**	**688.5**	**680.9**	**305.1**	**154.5**	**79.2**	**41.6**

Assumptions	
Annual Cost	$60,000
Probability of Approval	75%

Source: Leerink Partners Research and SEC filings

Meanwhile, SAGE-689 Moving into Trials Soon

- **SAGE-689 is being developed as an adjunctive IV therapy for the treatment of SE patients whose seizures have not resolved after treatment with BDZs in a non-hospital setting.** Patients with SE at this stage are transported by ambulance to the hospital and frequently receive treatment in the emergency room with anti-seizure drugs. If their seizure does not resolve rapidly, the patient must be transferred to the ICU and immediately placed into a medically induced coma to minimize the risk of brain damage. SAGE-689 is currently in IND-enabling toxicology and safety pharmacology testing. **SAGE plans on filing an IND for SAGE-689 in the second half of 2014 and to begin a Phase 1 clinical trial thereafter.**



Source: SEC filings

Strategic Overlap of ’547 and SAGE’s Platform Creates Operating Leverage…

LEERINK

- **…which could augment the magnitude of stock upside as clinical catalysts for follow-on compounds are realized.**

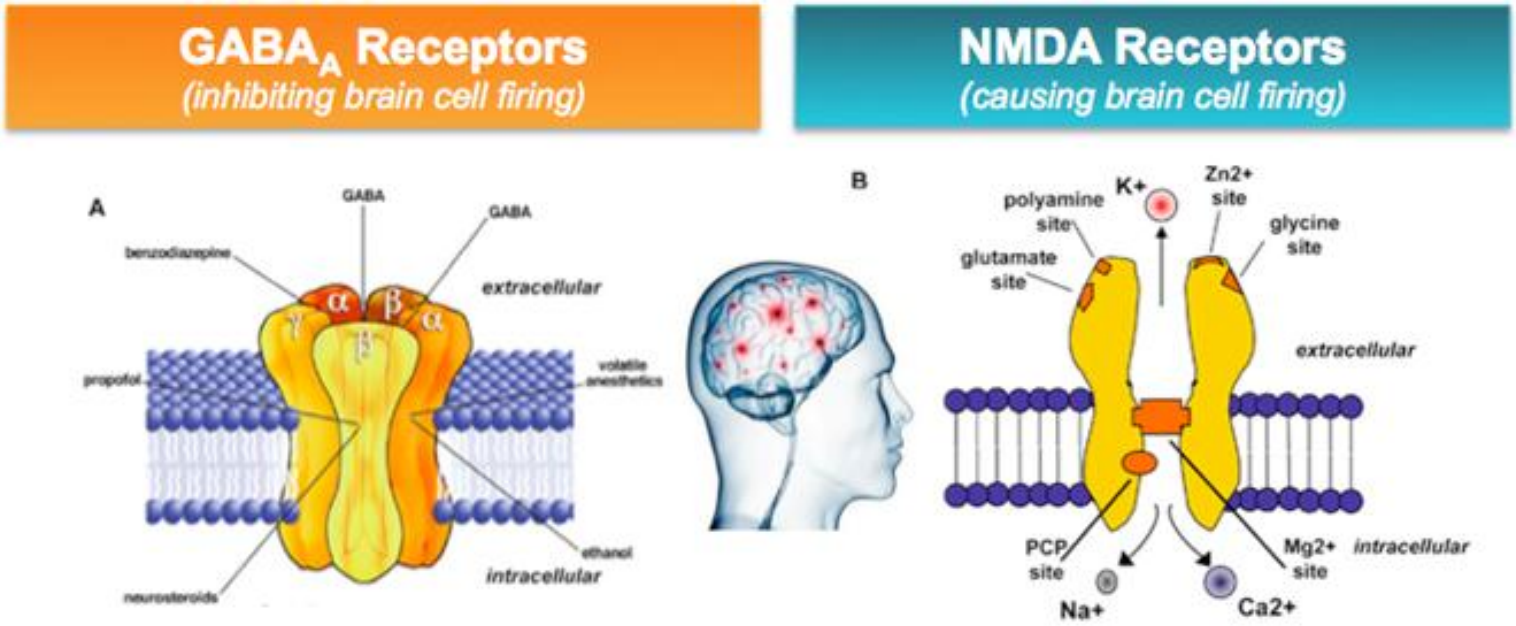
- **In addition to SAGE-689, SAGE is developing SAGE-217 as an IV monotherapy for RSE.** ’217 is currently in IND-enabling toxicology and pharmacology testing. SAGE-217 is being optimized to afford a long half life and multiple formulations suitable for IV and oral administration.

- **The potential long-half life of SAGE-217,** its ability to induce deep and prolonged anesthesia, its oral availability, and its potency at extra-synaptic $GABA_A$ receptors could distinguish the product from ’547 and ’689 and enable the development of an IV acute therapy and an oral maintenance therapy.

- **SAGE plans to file an IND for SAGE-217 in the first half of 2015.** In the Phase 1 development of SAGE-217, SAGE intends to assess sedative qualities, safety profile, cardiovascular safety, impact on EEG, and the drug’s ability to induce burst suppression.

Early Stage NMDA Program Presents Upside to Our Valuation

- SAGE is continuing to build its robust pipeline of proprietary positive and negative allosteric modulators targeting N-methyl-D-aspartate (NMDA) receptors at a unique, previously unknown binding site (non-glycine site). By targeting NMDA receptors at a novel allosteric binding site, SAGE's products in preclinical development could be able to mitigate the issues typically seen with alternate approaches including limited efficacy, tolerance, and safety. SAGE is evaluating future programs in cognition (schizophrenia, Alzheimer's disease, Parkinson's disease, and other conditions), autism, depression, epilepsy, and pain.
- **Shown in the following figure, similar to $GABA_A$ receptors, NMDA receptors are ubiquitous throughout the CNS, but their activation up-regulates neuronal firing and leads to arousal of various systems.**



Source: Company slides

SAGE Intellectual Property

- **Patents on SAGE-547 are pending and if issued, would protect the product until 2033; however in our model we solely assume that '547 is protected until the expiration of orphan drug exclusivity.**
- SAGE has also licensed patent applications from Washington University (WU) which are directed to certain GABA receptor modulating compounds and methods of using these compounds, for example in anesthesia or treatment of GABA-related disorders. If issued, these patents would have a statutory expiration date of December 2033. In addition, U.S. 7,781,421, solely owned by WU, expires in September 2027.
- In addition to the patent applications licensed from WU, SAGE owns nine patent families directed to additional GABA receptor modulating compounds and methods of using these compounds, for example in anesthesia or treatment of GABA-related disorders. Any U.S. patents that may issue from these patent families would have a statutory expiration ranging from October 2032 to August 2034. Other than SAGE-547 and SAGE-689, SAGE has pending within these patent families genus and species claims to the majority of the compounds in its $GABA_A$ receptor modulating compound collection, including SAGE-217. **These patent families are in the early stages of patent prosecution and include families for which only provisional applications have been filed.**
- SAGE also owns three families of applications directed to modulators of NMDA receptors. Two of these patent families are directed to compounds that modulate NMDA receptors, which can be used to treat NMDA receptor-related disorders such as CNS related conditions. One of these patent families is directed to using a naturally occurring compound as a biomarker for a subject who would benefit from treatment with a modulator of NMDA receptors. Any patents that may issue, if any, from these families of applications directed to modulators of NMDA receptors would have statutory expiration dates in September 2032 and March 2034.

Source: SEC filings

Other Epilepsy Syndromes Could Unlock a Much Larger Market Opportunity

LEERINK

- **In addition to SRSE and other types of status epilepticus, SAGE has plans to study its GABA modulating compounds in Dravet and Rett syndrome,** two areas of significant unmet need. Dravet specifically has garnered significant investor interest as of late when GWPH (OP) generated encouraging open-label data in 27 pediatric patients treated under an expanded access protocol. Meanwhile, Rett syndrome is a neurodevelopmental disorder that affects girls almost exclusively and is characterized by normal early growth and development followed by a slowing of development, loss of purposeful use of the hands, distinctive hand movements, slowed brain and head growth, problems with walking, seizures, and intellectual disability. There are ~5,000 Dravet patients and ~27,000 Rett patients in the US, rendering it likely that SAGE could garner protection in each indication with orphan drug exclusivity.
- **SAGE also believes that its platform could address a variety of neurological and psychiatric disorders, including, for example, fragile X syndrome, anxiety, and tremor.**

Source: SEC filings

Financial Model Assumptions

- **We project R&D expenses of $20.7MM, $41.0MM, and $49.2MM for 2014-2016 as SAGE advances ’547 through pivotal trials.**

- **For 2014, 2015 and 2016, we model SG&A of $8.5MM, $13.7MM, and $24.7MM, and expect this to increase to $44.4MM and $54.7MM (2017/2018, respectively) once SAGE launches ’547 after expected approval in 2017.**

- **After its IPO in 3Q14, we estimate that the company will have ~$134MM in cash at YE14, which we project to be sufficient to fund operations into late 2016, when we model a $120MM equity raise.**

- **We model the first SAGE-547 revenues in 2017, and project profitability in 2019.**

Source: Leerink Partners Research

Valuation and Risks to Valuation

- **We derive a $46 price target for SAGE shares based on a 12% discount rate and a 3% terminal growth rate.** Our base case assumption assumes ~$1B in peak-risk adjusted 2023E sales based on a 75% probability of approval for SAGE-547, and assumes ~$275MM in peak revenues in 2027E for SAGE-689 and SAGE-217.

- **Risks to our valuation include disappointing clinical data, regulatory setbacks, and commercial shortfalls.** Because SAGE has only one product currently being examined in patients, the occurrence of any of these could impact the stock significantly.

Source: Leerink Partners Research

SAGE P&L ($MM) GAAP	2013	1Q14	2Q14E	3Q14E	4Q14E	2014E	1Q15E	2Q15E	3Q15E	4Q15E	2015E	2016E	2017E	2018E
SAGE-547	-	-	-	-	-	-	-	-	-	-	-	-	19.1	72.9
SAGE-689	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SAGE-217	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Revenue (p/w)	-	-	-	-	-	-	-	-	-	-	-	-	**19.1**	**72.9**
COGS	-	-	-	-	-	-	-	-	-	-	-	-	1.9	7.3
R&D	14.4	4.2	5.0	5.5	6.0	20.7	8.0	10.0	11.0	12.0	41.0	49.2	54.1	59.5
SG&A	3.9	1.6	2.2	2.2	2.5	8.5	3.0	3.2	3.5	4.0	13.7	24.7	44.4	54.7
Operating Expenses	18.3	5.8	7.2	7.7	8.5	29.2	11.0	13.2	14.5	16.0	54.7	73.9	100.4	121.5
Operating Income	(18.3)	(5.8)	(7.2)	(7.7)	(8.5)	(29.2)	(11.0)	(13.2)	(14.5)	(16.0)	(54.7)	(73.9)	(81.3)	(48.6)
Interest Income (Expense)	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Income (expense)	(0.0)	-	-	-	-	-	-	-	-	-	-	-	-	-
EBT	(18.3)	(5.8)	(7.2)	(7.7)	(8.5)	(29.2)	(11.0)	(13.2)	(14.5)	(16.0)	(54.7)	(73.9)	(81.3)	(48.6)
Tax	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Income (Loss)	**(18.3)**	**(6.1)**	**(7.2)**	**(7.7)**	**(8.5)**	**(29.5)**	**(11.0)**	**(13.2)**	**(14.5)**	**(16.0)**	**(54.7)**	**(73.9)**	**(81.3)**	**(48.6)**
Diluted EPS	**$ (1.92)**	**$ (0.35)**	**$ (0.43)**	**$ (0.32)**	**$ (0.33)**	**$ (1.42)**	**$ (0.43)**	**$ (0.51)**	**$ (0.56)**	**$ (0.61)**	**$ (2.11)**	**$ (2.64)**	**$ (2.81)**	**$ (1.62)**
Basic Shares Outstanding	9.5	16.8	16.8	23.8	25.7	20.8	25.8	25.9	26.0	26.1	26.0	28.0	29.0	30.0
Diluted Shares Oustanding	9.5	16.8	16.8	23.8	25.7	20.8	25.8	25.9	26.0	26.1	26.0	28.0	29.0	30.0

Source: SEC Filings and Leerink Partners Research

SAGE BS & CFS ($MM) GAAP	2013	1Q14	2Q14E	3Q14E	4Q14E	2014E	1Q15E	2Q15E	3Q15E	4Q15E	2015E	2016E	2017E	2018E
Net Cash	**8.1**	**55.2**	**48.5**	**141.9**	**133.9**	**133.9**	**123.6**	**111.2**	**97.6**	**82.5**	**82.5**	**134.4**	**62.5**	**24.7**
Cash & Equivalents	8.1	55.2	48.5	141.9	133.9	133.9	123.6	111.2	97.6	82.5	82.5	134.4	62.5	24.7
Debt														
Change in Cash	**5.3**	**47.4**	**(6.8)**	**86.7**	**(8.0)**	**119.3**	**(10.3)**	**(12.4)**	**(13.6)**	**(15.0)**	**(51.4)**	**51.8**	**(71.9)**	**(37.8)**
Operating Cash Flow	**(17.5)**	**(5.6)**	**(6.8)**	**(7.2)**	**(8.0)**	**(27.6)**	**(10.3)**	**(12.4)**	**(13.6)**	**(15.0)**	**(51.4)**	**(67.2)**	**(69.9)**	**(34.8)**
Net Income (Loss)	(18.3)	(5.8)	(7.2)	(7.7)	(8.5)	(29.2)	(11.0)	(13.2)	(14.5)	(16.0)	(54.7)	(73.9)	(81.3)	(48.6)
SOE	0.1	0.2	0.4	0.5	0.5	1.6	0.7	0.8	0.9	1.0	3.3	5.9	9.9	11.4
D&A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.6	2.4
Other	0.7	0.0	-	-	-	0.0	-	-	-	-	-	-	-	-
Investing Cash Flow	**(0.0)**	**(0.0)**	**(0.0)**	**(0.0)**	**(0.0)**	**(0.0)**	**(0.0)**	**(0.0)**	**(0.0)**	**(0.0)**	**(0.0)**	**(1.0)**	**(2.0)**	**(3.0)**
CapEx	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(1.0)	(2.0)	(3.0)
Other	-	-	-	-	-	-	-	-	-	-	-	-		
Financing Cash flow	**22.8**	**53.0**	**-**	**93.9**	**-**	**146.9**	**-**	**-**	**-**	**-**	**-**	**120.0**	**-**	**-**
Equity Issuance (Buyback)	22.8	53.0	-	93.9	-	146.9	-	-	-	-	-	120.0	-	-
Debt Issuance (Retirement)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: SEC Filings and Leerink Partners Research

SAGE DCF Analysis	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	TV
Cash Flow From Operations ($MM)	(28)	(51)	(67)	(70)	(35)	55	184	287	397	528	469	443	439	316	207	139	77	
Cash Flow From Investing ($MM)	(0)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	
Net Borrowing (Repayment) ($MM)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Free Cash Flow ($MM)	(28)	(51)	(68)	(72)	(38)	51	179	281	390	520	460	434	430	307	198	130	68	783
Discount Periods	-	0.50	1.50	2.50	3.50	4.50	5.50	6.50	7.50	8.50	9.50	10.50	11.50	12.50	13.50	14.50	15.50	
NPV FCF ($MM)	(14)	(49)	(57)	(54)	(25)	31	96	135	167	199	157	132	117	74	43	25	12	135

Sum NPV FCF ($MM)	1123
Net Cash 3Q14E	142
Implied SAGE Mkt Cap ($MM)	**$ 1,265**
SAGE Per Share Value	**$ 45.83**

Cost of Equity	12%
TG Rate	3%
Diluted Shares Oustanding YE14	27.6

Source: Leerink Partners Research

SAGE-547 SRSE Revenue Model	2014E	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
US Status Epelepticus Patients	150,000	151,350	152,712	154,087	155,473	156,873	158,284	159,709	161,146	162,597	164,060	165,537	167,026	168,530	170,046	171,577	173,121
% refractory to benzodiazepines	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
Second-Line Status Epelepticus Patients	50,000	50,450	50,904	51,362	51,824	52,291	52,761	53,236	53,715	54,199	54,687	55,179	55,675	56,177	56,682	57,192	57,707
% refractory to AEDs	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%
Refractory Status Epelepticus (RSE) Patients	35,000	35,315	35,633	35,954	36,277	36,604	36,933	37,265	37,601	37,939	38,281	38,625	38,973	39,324	39,678	40,035	40,395
% super refractory - 1 failed wean attempt	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%
Super RSE Patients	25,000	25,225	25,452	25,681	25,912	26,145	26,381	26,618	26,858	27,099	27,343	27,589	27,838	28,088	28,341	28,596	28,854
%RSE treated with SAGE-547	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
%SRSE treated with SAGE-547	0.0%	0.0%	0.0%	1.5%	5.0%	10.0%	20.0%	30.0%	40.0%	50.0%	30.0%	18.0%	10.8%	5.0%	3.0%	2.0%	2.0%
Patients on SAGE-547	-	-	-	385	1,296	2,615	5,276	7,985	10,743	13,550	8,203	4,966	3,006	1,404	850	572	577
Annual Cost of Therapy	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000
US Gross Revenues ($MM)	0	0	0.0	23.1	77.7	156.9	316.6	479.1	644.6	813.0	492.2	298.0	180.4	84.3	51.0	34.3	34.6
Approval Probability	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
US Probability-Weighted Revenues ($MM)	**0**	**0**	**0.0**	**17.3**	**58.3**	**117.7**	**237.4**	**359.3**	**483.4**	**609.7**	**369.1**	**223.5**	**135.3**	**63.2**	**38.3**	**25.7**	**26.0**
ROW as % of US	0%	0%	0%	10%	25%	35%	45%	55%	60%	65%	129%	245%	457%	587%	582%	519%	308%
SAGE-547 ROW Gross Revenues ($MM)	-	-	-	2	19	55	142	264	387	528	634	729	824	494	297	178	107
SAGE-547 ROW p(w) Revenues ($MM)	**0**	**0**	**0**	**1.7**	**14.6**	**41.2**	**106.8**	**197.6**	**290.1**	**396.3**	**475.6**	**546.9**	**618.0**	**370.8**	**222.5**	**133.5**	**80.1**
y/y Growth Rate						283%	259%	185%	147%	137%	20.0%	15.0%	13.0%	-40.0%	-40.0%	-40.0%	-40.0%
	-	-	-	25.4	97.2	211.8	459.0	742.6	1,031.3	1,341.4	1,126.3	1,027.2	1,004.4	578.7	347.7	212.3	141.4
SAGE-547 WW P(w) Revenues	**0**	**0**	**0**	**19.1**	**72.9**	**158.8**	**344.3**	**557.0**	**773.5**	**1006.1**	**844.7**	**770.4**	**753.3**	**434.0**	**260.8**	**159.2**	**106.1**

Assumptions	
Annual Cost	$60,000
Probability of Approval	75%

Source: Leerink Partners Research

Product	Event	Timing
SAGE-547	Top-line Phase I/II Data	2H14
SAGE-547	Initiate Pivotal Trials	2015
SAGE-689	Initiate Phase I Studies	2015
SAGE-217	Initiate Phase I Studies	2015

Source: SEC Filings and Leerink Partners Research

Disclosures Appendix

Analyst Certification

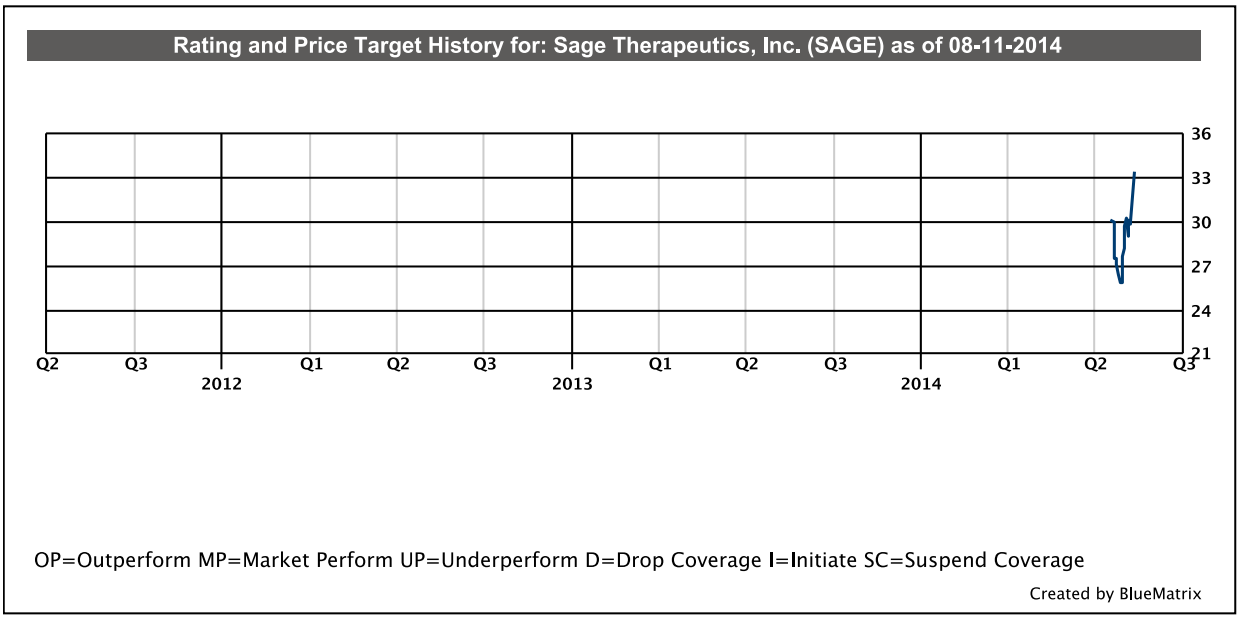
I, Joseph P. Schwartz, certify that the views expressed in this report accurately reflect my views and that no part of my compensation was, is, or will be directly related to the specific recommendation or views contained in this report.

Valuation

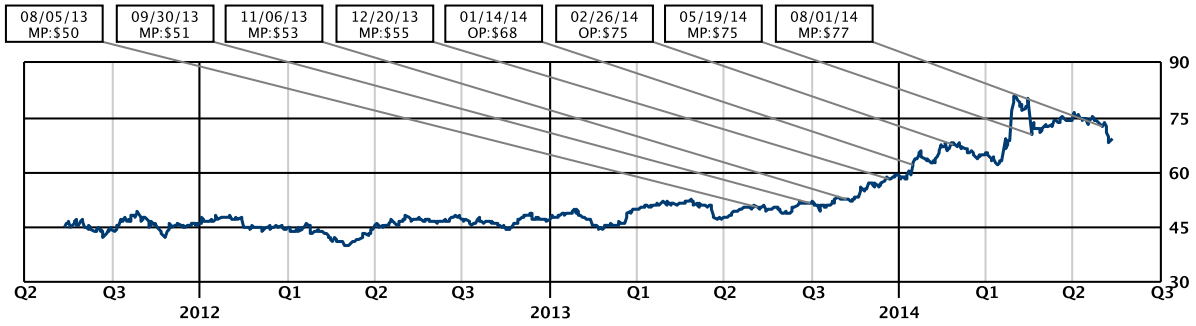
We derive a $46 price target for SAGE shares based on a 12% discount rate and a 3% terminal growth rate. Our base case assumption assumes ~$1B in peak-risk adjusted 2023E sales based on a 75% probability of approval for SAGE-547, and assumes ~$270MM in peak revenues in 2027E for SAGE-689 and SAGE-217.

Risks to Valuation

Risks to our valuation include disappointing clinical data, regulatory setbacks, and commercial shortfalls. Because SAGE has only one product currently being examined in patients, the occurrence of any of these could impact the stock significantly.



Rating and Price Target History for: AstraZeneca PLC (AZN) as of 08-11-2014

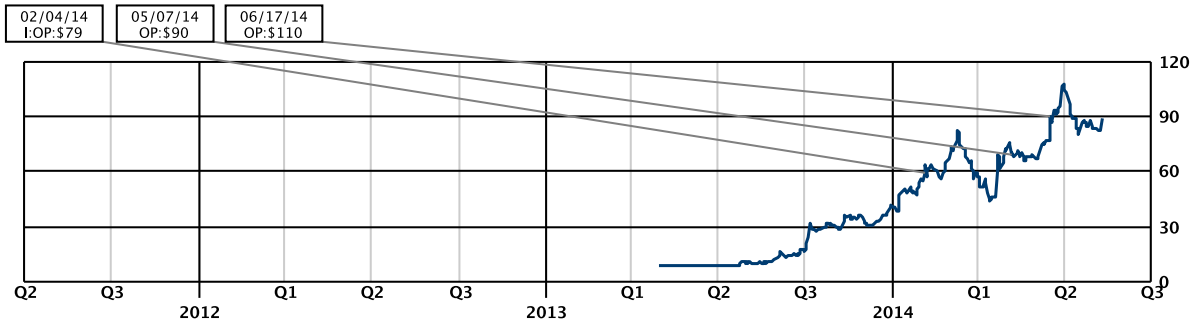


Leerink Swann initiated coverage of AZN with a Market Perform rating on Sept. 30, 2009. On June 11, 2013, Leerink Swann began a transition to specific price targets for the stocks under its coverage, replacing valuation ranges.

OP=Outperform MP=Market Perform UP=Underperform D=Drop Coverage I=Initiate SC=Suspend Coverage

Created by BlueMatrix

Rating and Price Target History for: GW Pharmaceuticals PLC (GWPH) as of 08-11-2014



OP=Outperform MP=Market Perform UP=Underperform D=Drop Coverage I=Initiate SC=Suspend Coverage

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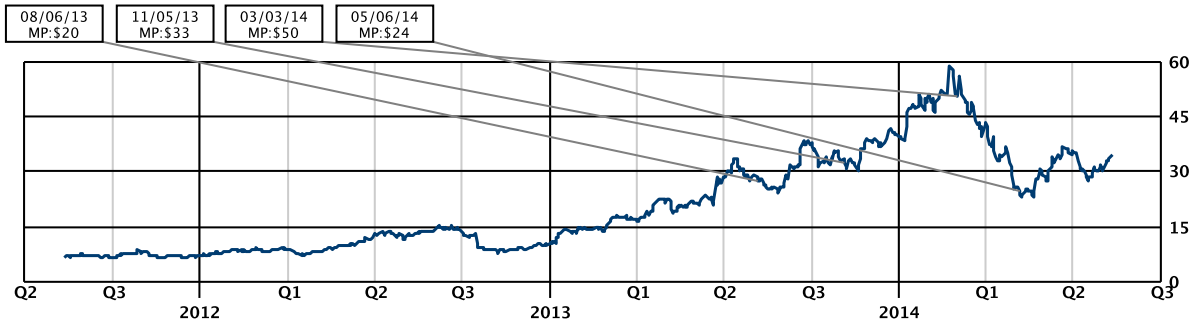
Rating and Price Target History for: Isis Pharmaceuticals, Inc. (ISIS) as of 08-11-2014

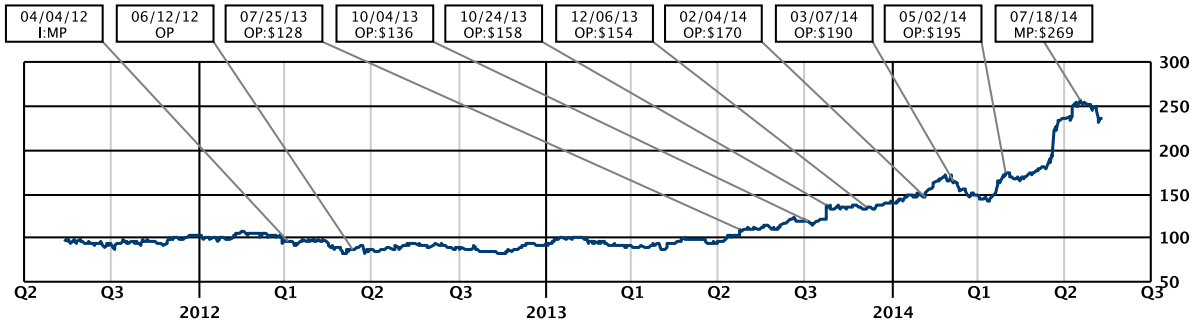


Leerink Swann placed a Market Perform rating on ISIS on April 18, 2008. On June 11, 2013, Leerink Swann began a transition to specific price targets for the stocks under its coverage, replacing valuation ranges.

OP=Outperform MP=Market Perform UP=Underperform D=Drop Coverage I=Initiate SC=Suspend Coverage

Created by BlueMatrix

Rating and Price Target History for: Shire Pharmaceuticals Plc (SHPG) as of 08-11-2014



Leerink Swann suspended coverage of SHPG on June 1, 2010. On June 11, 2013, Leerink Swann began a transition to specific price targets for the stocks under its coverage, replacing valuation ranges.

OP=Outperform MP=Market Perform UP=Underperform D=Drop Coverage I=Initiate SC=Suspend Coverage

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Distribution of Ratings/Investment Banking Services (IB) as of 06/30/14				
			IB Serv./Past 12 Mos.	
Rating	Count	Percent	Count	Percent
BUY [OP]	138	69.00	50	36.20
HOLD [MP]	62	31.00	2	3.20
SELL [UP]	0	0.00	0	0.00

Explanation of Ratings

Outperform (Buy): We expect this stock to outperform its benchmark over the next 12 months.

Market Perform (Hold/Neutral): We expect this stock to perform in line with its benchmark over the next 12 months.

Underperform (Sell): We expect this stock to underperform its benchmark over the next 12 months.The degree of outperformance or underperformance required to warrant an Outperform or an Underperform rating should be commensurate with the risk profile of the company.

For the purposes of these definitions the relevant benchmark will be the S&P 600® Health Care Index for issuers with a market capitalization of less than $2 billion and the S&P 500® Health Care Index for issuers with a market capitalization over $2 billion.

Important Disclosures

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MEDACorp is a network of healthcare professionals, attorneys, physicians, key opinion leaders and other specialists accessed by Leerink and it provides information used by its analysts in preparing research.

In the past 12 months, the Firm has received compensation for providing investment banking services to Sage Therapeutics, Inc. .

Leerink Partners LLC makes a market in Sage Therapeutics, Inc., Biogen IDEC, Inc., GW Pharmaceuticals PLC, Isis Pharmaceuticals, Inc. and Shire Pharmaceuticals Plc.

Leerink Partners LLC is willing to sell to, or buy from, clients the common stock of AstraZeneca PLC on a principal basis.

Leerink Partners LLC has acted as the manager for a public offering of Sage Therapeutics, Inc. in the past 12 months.

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