

Initiation of Coverage July 16, 2014 BIOTECHNOLOGY

Equity Research

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Radius Health, Inc. (RDUS-\$12.14)

Rating: BUY

Target Price: \$20.00

No Bones About It - Initiating with a BUY and \$20 Price Target

<u>EPS</u>	<u>1Q</u>	<u>2Q</u>	<u>3Q</u>	<u>4Q</u>
2013E	_	_	_	_
2014E	_	_	_	_
2015E				_
<u>REV</u>	<u>1Q</u>	<u>2Q</u>	<u>3Q</u>	<u>4Q</u>
2013E	_	_	_	
2014E	_	_	_	_
2015E	_	_	_	_
<u>FY</u>	2013E	20	14 <u>E</u>	<u>2015E</u>
EPS	(235.0	0)E (18	38.00)E	(1.23)E
REV	0.0E	0.0)E	0.0E

Strong Value Proposition. We are initiating coverage of Radius Health ("Radius") with a BUY rating and \$20 price target. We like the simplicity of the company's value proposition: a late stage asset with near-term revenue potential, with the potential to cannibalize a \$1 billion product in a market with strong demographic trends.

Proximity to FDA Filing. Radius is currently conducting a Phase III study of abaloparatide-SC, for the treatment of osteoporosis, and expects initial 18-month fracture data to be available in 4Q:14, followed by 24-month fracture data from a six-month extension study shortly thereafter. Assuming that the Phase III trial results follow the strong Phase II data that demonstrated rapid increase in bone mineral density with low side effects, we expect that the company will begin regulatory filings in 2015, with potential commercialization in 2016.

Life Cycle Management. In addition to the current subcutaneous formulation of abaloparatide, Radius is developing a transdermal formulation, and that could be on the market shortly after the approval of the subcutaneous formulation. We like the potential for life cycle management and product differentiation.

Better Mousetrap? The ultimate potential of abaloparatide, we believe, rests with the ability to demonstrate advantages over Forteo (teriparatide, Eli Lilly). Because abaloparatide is a synthetic peptide analog of parathyroid hormone-related protein, it may confer advantages in terms of building bone faster with less hypercalcemia, a known adverse effect of Forteo. Additionally, abaloparatide does not need to be refrigerated and could potentially be used in combination with other osteoporosis agents, though we have not included this in our model.

Radius has Full Control. Radius licensed abaloparatide from Ipsen, and retains rights to market in the U.S. and Europe. The company plans to submit NDAs in the U.S. and Europe, though we have just used U.S.-based revenue in our model. We think Europe, and potentially a partnership, represent upside.

Other Candidates are Upside. In addition to the transdermal formulation of abaloparatide, Radius has two other drugs in its pipeline. RAD1901 is being explored for the treatment of bone metastases associated with breast cancer and menopausally-related vasomotor symptoms, though the latter indication is likely to be outlicensed. Another compound, RAD401, is in preclinical development for a variety of metabolically-related conditions.

Current Statistics

Market Cap (\$Mil)	\$351.3
Avg. Daily Trading Volume (3 mo.):	NA
Shares Out (Mil):	28.939
52 Wk. Range	\$17.32-\$7.46



Summary

Radius Health (Radius) is a development-stage company focused on commercializing treatments for osteoporosis and other serious endocrine-mediated disorders. The company has a portfolio of compounds in development for a variety of disorders predominantly affecting women, including a Phase III candidate for the treatment of osteoporosis, a major cost to the healthcare system, with over 40 million individuals in the U.S. alone considered to have osteoporosis or be at risk of fracture due to low bone mineral density (BMD). But what we find most compelling about Radius is the proximity to commercialization, as the company's Phase III trial of abaloparatide-SC is anticipated to produce data by the end of 2014 and could represent a replacement for Forteo, a \$1+ billion drug for the treatment of severe osteoporosis. With the potential to have clinically meaningful differentiation versus Forteo and a transdermal line extension (abaloparatide-TD), and a relatively short time to commercialization, we believe the opportunity for valuation expansion is high. Our \$20 price target is based on a discounted revenue and EPS calculation, based on U.S. revenues of abaloparatide-SC and abaloparatide-TD in 2020. We have not incorporated revenue from Europe or other sources in our model.

Company History

With a somewhat unique path to market, Radius Health completed a public offering in June 2014, though the origins of the company's development effort dates back to 2003, when the predecessor Radius Health was formed to develop a portfolio of drugs for the women's healthcare market, including osteoporosis and vasomotor symptoms. In 2011, the predecessor Radius Health merged with MPM Acquisition Corp., an unlisted public reporting shell company ("blank check company"), with the surviving entity renamed Radius Health Inc. This entity continued as a reporting company until an initial public offering of 6.5 million shares in June 2014 converted Radius' status to a fully-listed NASDAQ company, trading under the ticker RDUS.

The genesis of the company's development efforts stems from compounds (and families) in-licensed from Ipsen Pharma (2005) and Eisai (2006), all of which have applications in women's health and serious endocrine-mediated disorders (osteoporosis, vasomotor symptoms related to menopause, breast cancer, etc.). Abaloparatide, the company's lead product in development for osteoporosis, produced positive Phase II data in 2009, suggesting greater bone mineral density growth versus teriparatide, the only anabolic growth agent on the market, and a Phase III trial was initiated in 2011. Following the release of the Phase II data, Novartis, which held an option to commercialize abaloparatide outside Japan (Radius does not have rights in Japan) declined to do so as result of a strategic prioritization initiative, which prompted, we believe, a new financing strategy for the company that resulted in a reverse merger between MPM Acquisition Corp (an early investor in the company) and the first Radius Health, and a multi-draw term loan facility. In 2013, Robert Ward was named President and Chief Executive Officer, bringing a stronger commercial focus to the company.

Osteoporosis is a Large Market, Major Cost to the Healthcare System

Industry Overview

Osteoporosis, a disease characterized by low bone mass density and structural deterioration of bone tissue, leads to greater fragility and an increase in fracture risk as the disease progresses. Prevalence of osteoporosis, particularly in the United States, continues to grow as the population ages. There are multiple causes of the disease, though the single largest cause is aging and effects of the loss of sex hormones in women (men, too, can suffer from the disease, though the incidence is lower). The National Osteoporosis Foundation (NOF) estimates approximately 54 million Americans have osteoporosis and low bone mass, and as many as one in two women and up to one in four men over the age of 50 will break a bone due to osteoporosis. Because osteoporosis is often not diagnosed until a fracture occurs, it is likely largely underdiagnosed and undertreated.



Age- and gender-specific incidence of vertebral, hip and distal forearm fractures

Women

Rackograhic

Wentebral

Men

Age (years)

Age (years)

Exhibit 1: Rates of Osteoporosis in Women and Men (U.S.)

Source: International Osteoporosis Foundation, Cantor Fitzgerald research

The economic impact of osteoporosis is far reaching. With the disease estimated to be responsible for roughly two million broken bones and \$19 billion in related heathcare costs annually in the United States, it is a sizable cost to the healthcare system, and appears to be growing. According to the NOF, osteoporosis will be responsible for approximately three million fractures and \$25.3 billion in annual costs to the healthcare system by 2025. The primary reason for this growth is attributed to aging of the population, while secondary factors include an increase in the use of drugs that induce bone loss such as glucocorticoids and hormone therapies used in the treatment of cancer.

Exhibit 2: Hospitalizations Due to Fractures

Condition	Discharges (in thousands)	Days of Care (in thousands)	Average Length of Stay (in days)
Females with Deliveries	3,951	10,762	2.7
Heart Disease	3,724	17,120	4.6
Psychoses	1,543	11,130	7.2
Malignant Neoplasms	1,212	7,655	6.3
Pneumonia	1,128	5,847	5.2
Fractures	1,113	6,761	6.1
Osteoarthritis and Allied Disorders	1,057	3,598	3.4
Complications of Surgical and Medical Care	1,017	6,017	5.9
Cerebrovascular Disease	1,015	6,151	6.1
Septicemia	808	7,111	8.8

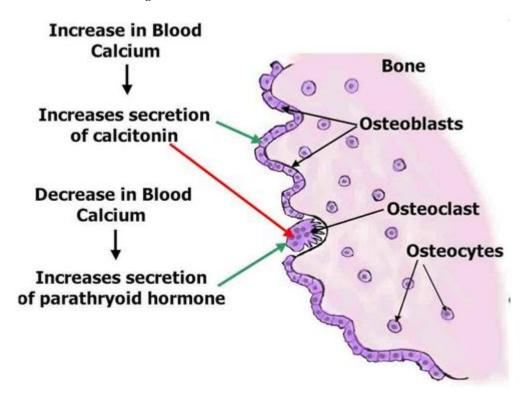
Source: Centers for Disease Control and Prevention, Cantor Fitzgerald research



Bones Out of Balance

Because bones continually undergo a process called remodeling, or bone turnover, the integrity of bones is a balance between bone resorption, or breakdown, and bone formation. Resorption occurs when the body requires calcium, which is stored in bone. Osteoclasts are specific cells responsible for breaking down the surface of the bone, leaving cavities that allow calcium to be released. Osteoblasts are then summoned to action, releasing collagen and other proteins into the cavities and stimulating bone mineralization. Eventually osteoblasts combine with protein and other substances in the body to form new bone material, replacing bone material lost to resorption. In normal bone metabolism, resorption and formation are in reasonable equilibrium. However, bone loss (osteoporosis) occurs when the normal process of remodeling does not replace enough bone to cover bone loss. Interestingly, bone resorption occurs more quickly than bone formation, with resorption taking a few weeks while formation can take upward of three months. And while this lag is typically not an issue, in cases where turnover is high, and bone is not being added fast enough to compensate for normal remodeling, osteoporosis occurs.

Exhibit 3: Bone Remodeling



Source: New York Center for Advanced Parathyroid Surgery, Cantor Fitzgerald research

Treating the Disease Helps but not Enough

The vast majority of anti-osteoporosis drugs today work as anti-resorptives (bisphosphonates, SERMs, estrogen) that slow the rate of resorption, producing modest increases in bone mineral density, a contributor to bone strength, and reducing fractures.

Bisphosphonates have been the standard of care in treating osteoporosis, but both physicians and patients have grown increasingly cautious about the side effects associated with longer-term use of this class of drugs. Serious adverse events such as osteonecrosis and atypical fractures have been reported, and as a result, many physicians are seeking an alternative to the anti-resorptive bisphosphonate regimen. Additionally, gastrointestinal side effects can be an

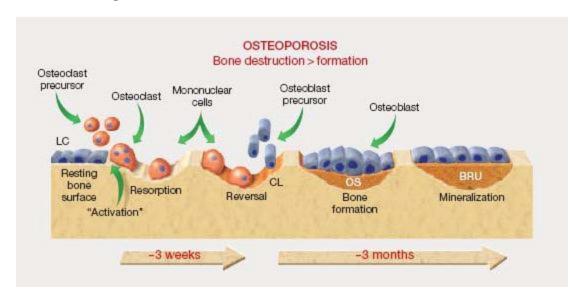


issue in the oral formulations, and real-world studies suggest this is an impediment to compliance.

- **SERMs**, such as Eli Lilly's Evista (raloxifene) work by exerting similar effects of estrogen on bone, which increases BMD, and has been shown to decrease spinal fractures in postmenopausal women. However, Evista has also been associated with increasing the risk of blood clots, including deep vein thrombosis (DVT) and pulmonary embolism (blood clots in the lung), similar to the risk from estrogen therapy. In addition, Evista can cause hot flashes.
- Anabolic agents, such as parathyroid hormone (PTH), work by stimulating the activity of osteoblasts, which build new bone, rather than slowing bone breakdown. Forteo (teriparatide), marketed by Eli Lilly, a recombinant PTH (34-N terminal amino acid sequence), is the only approved drug to do so, having shown increases in bone mineral density of up to 9%, and reducing vertebral fractures by up to 70% and nonvertebral fractures by close to 50%. PTH is secreted by the parathyroid gland and regulates bone metabolism and calcium homeostasis. Forteo has also been associated with improved bone architecture (the interior structure of bone as well as the outer thickness of the bone), and preferentially stimulates osteoblastic activity over osteoclastic activity. Eli Lilly reported 2013 Forteo sales of approximately \$1.2 billion globally. In spite of its ability to build bone, there are limitations to Forteo's use, and they include the time it takes to achieve optimal-build bone, waning effect after two years, and concern of hypercalcemia. Additionally, combination use with antiresorptive agents is not typically employed because of concerns over safety. Physiologically, continuous excess of endogenous PTH may be more harmful than good because bone resorption may be preferentially stimulated versus bone formation.
- RANK Ligand (RANKL) monoclonal antibody, another mechanistically different agent for treating post menopausal osteoporosis is Prolia (denosumab), developed by Amgen. Prolia is a monoclonal antibody that inhibits the receptor activator of nuclear factor kappa-B ligand (RANKL), a protein that acts as the primary signal for bone removal. Prolia was approved by FDA in June 2010 for the treatment of osteoporosis, and is also marketed as XGEVA, for the prevention of skeletal-related events in patients with bone metastases from solid tumors. In 2013 the drug posted sales of approximately \$740 million worldwide. Like Forteo, Prolia is given subcutaneously, but dosed only bi-annually. While Prolia is associated with improved outcomes in osteoporosis, a recent meta analysis by Lin et al appearing in the International Journal of Clinical Practice and encompassing results from 1,942 patients suggests that there is "low evidence quality" that Prolia had improved outcomes vs. Fosamax when examining fracture rates. However, the review found "moderate to high quality evidence" that Prolia was more effective at increasing BMD at several sites (distal radius, total hip, lumbar spine, femoral neck). Serious adverse events, such as neoplasms and infections, were determined to be similar between the treatments.



Exhibit 4: Bone Degradation and Formation



Source: Sigafoose Chiropractic Center, Cantor Fitzgerald research

Competitive Landscape

While the currently available agents for the treatment of osteoporosis have limitations, they also have known safety profiles and established efficacy, and that creates a high bar, in our view, for new agents. There are a number of new agents and targets in development for the treatment of osteoporosis, with the most advanced being Merck's odanacatib, a cathepsin K inhibitor (cathepsin K is an enzyme involved in bone resorption). Merck expects to file for approval of this drug in 2014, and while efficacy has been compelling, trial results included a numerical imbalance in atrial fibrillation and stroke, as well as rash. Another new target is Amgen's anti-sclerostin romosozumab, which works to block the inhibitory effects of sclerostin on bone formation, which has shown increases in BMD greater than Forteo in Phase II studies (though not greater than the Phase II results produced by abaloparatide-SC, to date). Fracture data from this drug is expected in 2015. There are also other transdermal teriparatide formulations in clinical trials, though they appear to be at earlier stages of development.

Exhibit 5: New Agents in Development for Osteoporosis

Drug	Sponsor	Administration	Description	Phase	Estimated Completion Date
MicroCor PTH	Corium International, Inc.	Transdermal Patch	PTH formulation	I	NA
rhBMP-2/CPM	Pfizer Inc.	Local Injection	Bone Morphogenetic Protein	П	Apr-15
ZP-PTH	Zosano Pharma Corp.	Transdermal Patch	Synthetic Peptide Analog of human parathyroid hormone-related protein	II	2H:15
PREOB	Bone Therapeutics SA	Percutaneous Injection	Autologous Osteoblastic Cell Product	П	Oct-16
Abaloparatide	Radius Health Inc.	Subcutaneous Injection, Transdermal Patch	Synthetic Peptide Analog of human parathyroid hormone-related protein	III	Dec-14
Odanacatib	Merck & Co., Inc.	50mg Oral Tablet	Cathepsin K Inhibitor	III	May-15
Romosozumab	Amgen Inc.	Subcutaneous Injection	Monoclonal Antibody which targets sclerostin	Ш	Mar-17

 $Source:\ Clinical Trials. gov,\ Cantor\ Fitzgerald\ research$



Company Overview

Radius is a development-stage company with a late-stage product candidate for osteoporosis, and an alternative formulation (transdermal) of the same candidate in an earlier stage of testing. Radius is also developing therapeutics for other endocrine-related disorders, including anti-hormonal agents for breast cancer. But with a late-stage product months away from pivotal results, the focus is squarely on abaloparatide for the treatment of osteoporosis.

Exhibit 6: Company Pipeline

Candidate	Indication	Phase of Development					
	indedition	PreClinical	Phase I	Phase II	Phase III		
Abaloparatide-SC (Subcutaneous Injection)	Osteoporosis				\Rightarrow		
Abaloparatide-TD (Transdermal Patch)	Osteoporosis			\Rightarrow			
DA D1001	Vasomotor Symptons			\Rightarrow			
RAD1901	Breast Cancer Brain Metastases		\Rightarrow				
RAD140	Cachexia/Frailty/Breast Cancer						

Source: Radius Health, Cantor Fitzgerald research

Abaloparatide

Abaloparatide is a synthetic peptide analog of parathyroid hormone-related protein (PTHrP) that functions as a bone anabolic treatment (grows bone). The Phase III program is currently being conducted in 2,468 patients across 28 sites in the U.S., Europe, Asia, and Latin America, and results are expected by the end of 2014. The company's two formulations (subcutaneous, consistent with Eli Lilly's Forteo, and transdermal) are in clinical testing, with Phase II results of the abaloparatide-SC (subcutaneous) demonstrating an advantageous safety profile (lower hypercalcemia vs. Forteo) and efficacy (faster and greater bone growth vs. Forteo). The drug's profile, we believe, is directly tied to its mechanism as a regulator of bone formation and its selectivity for receptor conformation (R⁰, RG), suggesting it has the ability to activate the parathyroid hormone receptor but with less downstream signaling than Forteo, a 34 N-terminal amino acid sequence of human parathyroid hormone. Forteo is able to stimulate new bone formation, but in addition to binding with high affinity to osteoblast receptors in bone, also binds to cell surface receptors in the kidney. Forteo is able to build bone but is also associated with hypercalcemia, a condition in which excess calcium remains in the bloodstream.

Anabolic agents work by stimulating the activity of osteoblasts, which build new bone, rather than slowing bone breakdown. While Forteo, a recombinant PTH, is considered the strongest of the anti-osteoporosis agents for building bone, the drug has a number of limitations, which include delivery (injectable), time to onset of action (one year), side effects (hypercalcemia), and lack of combinability. Thus, while Forteo has also been associated with improved bone architecture (the interior structure of bone as well as the outer thickness of the bone), its use today is limited.

Selectivity is Key

Abaloparatide's early data suggests it is able to overcome a number of the limitations associated with Forteo use. Much of this is attributed to the differences in the target, parathyroid hormone-related peptide (PTHrP), and appears to have greater conformational (spatial arrangements) receptor selectivity. While both PTH and PTHrP are mediated by the same receptor, they have divergent effects in bone, likely stemming from PTH's role in bone homeostasis versus PTHrP's role as a promoter of bone formation. Early clinical studies support this view, as earlier and greater gains in bone mineral density were observed in abaloparatide-treated patients vs. Forteo. According to a study presented at



the 2014 Joint Meeting of the International Society of Endocrinology and the Endocrine Society (ICE/ENDO), enhanced bone anabolic activity of abaloparatide vs. the 1-34 amino acid sequence of PTH may be the result of greater conformational selectivity.

According to work presented by Hattersley et al, the binding of abaloparatide was evaluated relative to two distinct PTHR1 conformations, R^0 and RG. While PTH (1-34 amino acid sequence) and PTHrP (1-36 amino acid sequence) bind to the RG conformation with similarly high affinities, PTHrP binds with a much lower affinity to R^0 . Abaloparatide displays similar high binding affinities to RG but a much lower binding affinity to R^0 , consistent with the 1-36 amino acid sequence of abaloparatide, suggesting that its binding ability to different conformations (R^0 vs. RG) cause less bone resorption vs. PTH (Forteo) and thus greater bone building.

Clinical data appear to bear this out, with two Phase II placebo controlled studies that included Forteo showing increased bone mineral density (BMD), in addition to animal and primate studies.

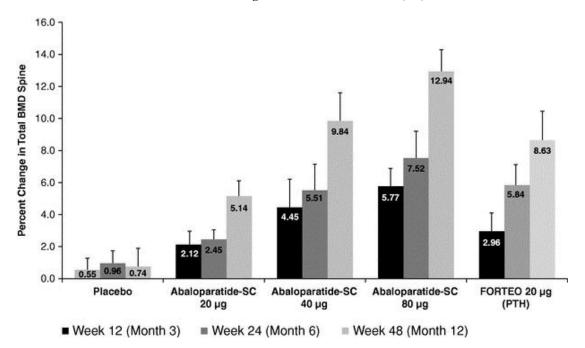
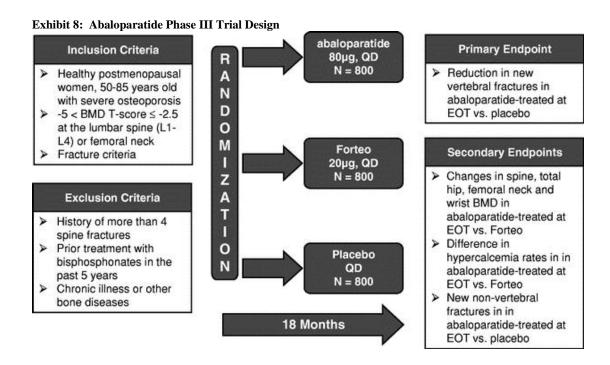


Exhibit 7: Phase II Data - Mean Percent Change from Baseline at Weeks 12, 24, and 48

Source: Radius Health, Cantor Fitzgerald research

Abaloparatide-SC is currently being tested in a Phase III trial designed to show that the drug is able to prevent new vertebral fractures versus placebo. The trial, which completed enrollment in 2013, is expected to report top-line, 18-month fracture data by the end of 2014. The trial will include data from 2,463 patients randomized to receive either abaloparatide (80 mcg), placebo, or Forteo (20 mcg) for 18 months. Following the initiation of the trial, the FDA informed Radius that 24-month fracture data would be required for approval, and subsequently agreed to accept an NDA that included (and preserved the integrity of) the Phase III 18-month endpoint, plus data from a 6-month extension study (to collect fracture at 24-months) that will support an NDA. The primary endpoint of the study is new vertebral fractures associated with abaloparatide vs. placebo at 18 months, with secondary measures including non-vertebral fractures vs. placebo, BMD (lumbar spine, hip, femoral neck) vs. Forteo, number of hypercalcemic events vs. Forteo, and 24-month fracture data. The trial is 90% powered for the primary endpoint of new vertebral fractures versus placebo.





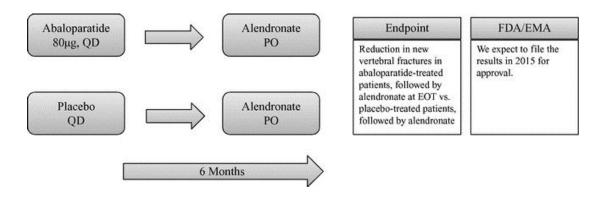
In early 2013, Radius announced that a planned interim analysis by the Data Safety Monitor Board (DSMB) examining accumulated safety data on greater than 75% of the planned study population of 2,400 women showed no SAEs, and the committee recommended that the trial continue unmodified. As part of the interim review, a blinded analysis was performed on safety reports of clinical, nonvertebral fractures in the study, with the blinded interim results showing promising signs of efficacy, with a 36% difference between the two arms. While the arms remained blinded, the following data emerged on the incidence of new clinical, non-vertebral fractures:

- Abaloparatide/placebo 1.2%
- Forteo 1.9%

In addition to the current Phase III trial, the company has also conducted, and is continuing to do so, studies that demonstrate abaloparatide's effects on bone architecture. We view such trials as supportive, and laying the groundwork for abaloparatide to become the anabolic agent of choice in the osteoporosis market. Animal studies have shown that animals treated with abaloparatide-SC have increased femur and vertebral bone strength. At present, a preclinical bone quality study in ovariectomized rats has been presented at the European Calcified Tissue Society (ECTS) Congress and revealed dose dependent increases in BMD following treatment, increases in bone formation markers and bone strength.



Exhibit 9: Extension Study Design



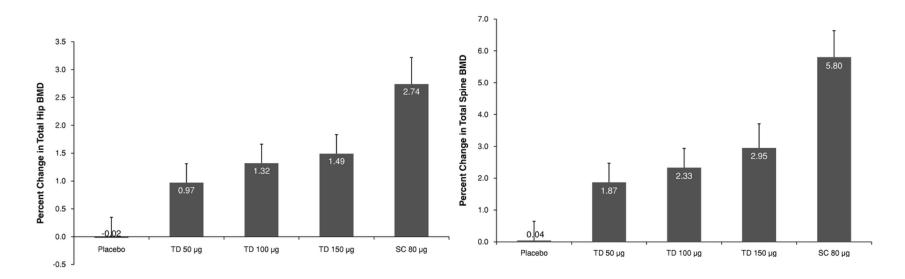
But Wait...There's More...Life Cycle Management

In addition to abaloparatide-SC, Radius is conducting studies of a transdermal formulation of abaloparatide (abaloparatide-TD), which is designed to be an alternative to the subcutaneous formulation. In addition to the appeal of needleless delivery and more convenient dosing, abaloparatide-TD has patent life that extends until 2032, well past the 2028 exclusivity for the subcutaneous formulation. The transdermal formulation employs 3M's Microstructured Transdermal System technology, which is considered an active transport technology, able to breach the skin barrier through the use of "microneedles" and deliver large doses transdermally, with a rapid delivery time.

Thus far, abaloparatide-TD has reported encouraging data, suggesting safety, tolerability, and efficacy in the treatment of osteoporosis. A Phase II trial conducted in 250 healthy postmenopausal women revealed that statistically significant mean percent increases from baseline for BMD at the lumbar spine versus placebo at all doses tested. At the highest doses (100 mg, 150 mg) there was a statistically significant mean percent increase from baseline in BMD at the hip versus placebo, and a statistically significant dosing trend for changes in both spine and total hip BMD.



Exhibit 10: Transdermal Formulation Mean Percent Change From Baseline at Six Months in Total Spine and Hip BMD





At present, Radius is working to optimize the formulation of abaloparatide-TD to achieve comparable efficacy to abaloparatide-SC. The current development plan is to complete such optimization and if Phase III results of the abaloparatide-SC study are positive, conduct a single non-inferiority Phase III trial comparing change in lumbar spine BMD at 12 months between abaloparatide-SC and abaloparatide-TD treated patients. Hence, we would expect such a trial to begin in 2015, following the release of Phase III data for the abaloparatide study.

Potential of Abaloparatide

We are intrigued by the potential of abaloparatide as a replacement for Forteo, as well as the opportunity to expand the market for anabolic bone agents. In simplest terms, abaloparatide may offer unique advantages to Forteo that make it more physician- and patient-friendly. For example, unlike Forteo, abaloparatide-SC will not need refrigeration. In addition, abaloparatide-SC may be able to build bone faster than Forteo, as demonstrated in Phase II testing, without the concern of hypercalcemia. While Forteo also carries a warning regarding concern of osteosarcoma, this is largely seen as an observed effect in rats, and abaloparatide's carcinogenicity studies suggest the same.

Exhibit 11: Phase 2 Data Comparison, Abaloparatide vs. Forteo

	Abaloparatide	Forteo
Dose	80mcg	20mcg
Dosing Frequency	Daily	Daily
Refrigeration Required	No	Yes
Number of Injections Per Dose	1	1
Type of Injection	Self	Self
Spine Mean Percent BMD Change from Baseline (24 weeks)	6.7%	5.5%
Spine Mean Percent BMD Change from Baseline (48 weeks)	12.9%	8.6%
Femoral Neck Mean Percent BMD Change from Baseline (48 weeks)	4.1%	2.2%

Source: Radius Health, Cantor Fitzgerald research

While we are not modeling this, we think that abaloparatide's mechanism, by acting on PTHrP rather than PTH, may enable physicians to use novel combinations of anti-osteoporotic medications, which is typically not done today. Further, because abaloparatide avoids some of the downstream interactions associated with Forteo, longer-term use may be possible. We think this represents notable potential upside.



Exhibit 12: Abaloparatide Revenue Model

Radius Health, Inc.							
(\$ in millions)	2014E	2015E	2016E	2017E	2018E	2019E	2020E
United States							
Number of Osteoporosis NRx	8,000,000	8,160,000	8,364,000	8,598,192	8,856,138	9,121,822	9,395,477
Forteo share	160,000	163,200	146,370	122,954	88,561	68,414	70,466
Abaloparatide-SC share	0	0	20,910	46,172	88,561	114,023	117,443
Abaloparatide-TD share	0	0	0	0	2,214	6,841	7,047
Number of Osteoporosis TRx	21,000,000	21,420,000	21,955,500	22,570,254	23,247,362	23,944,782	24,663,126
Forteo share	420,000	428,400	384,221	322,755	232,474	179,586	184,973
Abaloparatide-SC share	0	0	54,889	121,202	232,474	299,310	431,605
Abaloparatide-TD share	0	0	0	0	5,812	17,959	30,829
Monthly cost of abaloparatide-SC, TD	\$0.00	\$0.00	\$800	\$828	\$857	\$887	\$918
Total Sales, in millions (US)	\$0.00	\$0.00	\$43.91	\$100.36	\$204.21	\$281.41	\$424.52

Waiting in the Wings

Because of the combination of limited resources and the expense of clinical trials, almost all of Radius' cash resources have been used to advance abaloparatide-SC and abaloparatide-TD. However, the company does have "under the radar" clinical assets, namely RAD1901 (Phase I) and RAD140 (preclinical). Both candidates are at an early stage in development and are also not, in our view, factored into the company's valuation. Hence, we think any advancement or positive clinical news will represent upside for investors.

Building a Women's Healthcare Franchise

RAD1901. Licensed from Eisai in 2006 (worldwide rights except for Japan), RAD1901 is a selective estrogen regulator in development for the treatment of brain metastases associated with breast cancer (BCBM) and in a second formulation (lower dose) for the treatment of post-menopausal vasomotor symptoms (hot flashes). RAD1901, consistent with agents such as Evista (raloxifene), has both estrogen agonist and estrogen antagonist properties in different tissues. For instance, RAD1901 appears to protect against bone loss through its estrogen-like activities on bone, but unlike estrogen, does not stimulate endometrial growth. Preclinical studies show that RAD1901 does not stimulate replication of breast cancer cells, and has antiproliferative properties in mouse models of human breast cancer. But RAD1901 is able to cross the blood brain barrier at pharmacological levels that are detectable in the brain, and that suggests that the drug could be a meaningful treatment to estrogen receptor positive (ER+) brain cancers that have metastasized to the brain, as well as for the treatment of vasomotor symptoms in women experiencing menopausally-related hot flashes.

To date, a Phase II study in vasomotor symptoms was conducted in 100 healthy perimenopausal women, evaluating four doses from 10mg to 100 mg of RAD1901 versus placebo. Efficacy was observed at the 10 mg dose level, with a statistically significant reduction in the frequency of moderate and severe hot flashes for the study period, as well as at weekly time intervals from 2 to 4 weeks, compared to placebo. The drug did not produce a linear dose-response, and while numerical reductions in mean severity were observed, these did not reach statistical significance. However, given the effect on reduction in frequency of hot flashes over time and the modest safety profile of the drug, Radius believes that a larger Phase IIb study in vasomotor symptoms is warranted. The company has announced its intention to pursue a partner for such an indication.

In breast cancer, the use of anti-estrogen agents is well established. Tamoxifen, the first SERM to be employed in the treatment of breast cancer, is used both as a therapeutic for women with metastatic disease, and as a preventative agent for ER+ early stage breast cancer. Because RAD1901 appears to



have similar anticancer properties and crosses the blood brain barrier at pharmacologic doses, Radius is exploring this indication, initially with an MTD study currently underway, followed by a conventional anti-cancer development program in BCBM. We think there is substantial opportunity in this area, particularly given Roche's recent announcement to acquire Seragon, a private company developing small molecule drugs for the treatment of ER+ breast cancers for \$725 million plus \$1 billion in contingent milestone payments.

Exhibit 13: Selected Marketed Anti-Hormonal Agents

Drug	Туре	Indication
Raloxifene	SERM	Osteoporosis, breast cancer
Ospemifene	SERM	Dyspareunia
Tamoxifen	SERM	Breast cancer
Anastrozole	Aromatase inhibitor	Breast cancer
Letrozole	Aromatase inhibitor	Breast cancer
Exemestane	Aromatase inhibitor	Breast cancer
Formestane	Aromatase inhibitor	Breast cancer

Source: Symphony, Cantor Fitzgerald research

We think this is a potential area of upside for investors, both for hormone-related breast cancers and vasomotor symptoms. ER+ breast cancer is the most prevalent form of the disease, and the treatment of vasomotor symptoms is a large market, with drugs such as hormones, and other drugs such as off-label use of SNRIs, used to treat the condition. We would expect a positive Phase Ib trial in BCBM and/or a partner for the vasomotor indication to prompt a meaningful adjustment to the company's valuation.

Further Down the Line

RAD140. RAD140 is a nonsteroidal selective androgen receptor modulator (SARM) with potential applications in disorders such as osteoporosis, cancer-related cachexia and muscle frailty as well as the treatment of breast cancer. The drug was discovered in 2005, and shown in preclinical studies to have anabolic activity on muscle and bone of rats and monkeys. It appears to have high receptor selectivity and is oral with a long half-life, suggesting applications where there is a need to increase lean muscle mass and/or bone density. This drug is in preclinical testing, and hence, we have not included it in our valuation of Radius shares.



Management

Exhibit 14: Company Management

Executive	Position	Biography
Robert Ward	Chief Executive Officer	Robert Ward has managed all stages of drug development, commercialization, and strategic partnerships across multiple therapeutic areas. Mr. Ward previously served as Vice President for Strategy and External Alliances for the New Opportunities iMed of AstraZeneca, where he was responsible for finding activities in areas outside of AstraZeneca's historical therapeutic focus. Additionally he served as co-chair of the Joint Development Committees in AstraZeneca's drug development partnerships with Alcon and Galderma. Prior to AstraZeneca, Mr. Ward held positions of increasing responsibility with well established biopharmaceutical companies such as Genentech, NPS Pharmaceuticals, Schering-Plough, and Bristol-Myers Squibb. He received a B.A. in biology and a B.S. in Physiological Psychology from the University of California, Santa Barbara, an M.S. in Management from the New Jersey Institute of Technology, and an M.A. in Immunology from The Johns Hopkins University School of Medicine.
Nick Harvey, MBA	Chief Financial Officer	Nick Harvey has more than 15 years of experience in building and financing life sciences and technology companies. Prior to joining Radius, he served for four years as Managing Director of Shiprock Capital, a venture capital firm, where he was responsible for deal-sourcing, negotiating and closing transactions. Prior to Shiprock, Mr. Harvey served as CFO of a number of venture-backed companies over a 10-year period, including Transfusion Technologies and Transcend Therapeutics. Mr. Harvey holds an undergraduate degree in Economics, a law degree with first-class honors from the Australian National University, and an MBA from the Harvard Business School.
Alan Harris, MD, PhD, FRCP	Chief Medical Officer	Dr. Harris has over 25 years of experience in clinical research and development. Dr. Harris carries expertise in endocrinology, metabolism, diabetes, oncology, gastroenterology, cardiovascular disease, allergic and respiratory diseases. He has played a central role in the approval process and clinical development of 17 peptides, small molecules, and biological pharmaceutical drugs, including Natpara (thPTH 1-84), and has conducted or overseen hundreds of clinical trials in over 30 countries. Dr. Harris was the Senior Vice President of R&D and the Chief Medical Officer of NPS Pharmaceuticals, and Therapeutic Head of Worldwide Medical Endocrine Care for Pfizer. Dr. Harris received his medical degree from the Louis Pasteur Faculty of Medicine, University of Strasbourg, France, and his Ph.D. in endocrinology from Erasmus University, Rotterdam, The Netherlands. Dr. Harris has authored over 120 peer-reviewed scientific papers.
Greg Williams, PhD, MBA	Chief Development Officer	Dr. Williams is a pharmaceutical industry and drug development veteran with more than 30 years of experience leading new product development, regulatory affairs, lifecycle management and commercialization for both small biotechnology and large pharmaceutical companies. Prior to joining Radius, Dr. Williams was Vice President of Regulatory Affairs, Global Product and Clinical Development, and Program Management with The Medicines Company. Earlier positions include Vice President of Regulatory Affairs, Regulatory Compliance and Program Management for NPS Pharmaceuticals, as well as management level positions with Yamanouchi Pharma America, Theraport Biosciences, GlaxoSmithKline Consumer Healthcare, and Parke-Davis Pharmaceutical. Dr. Williams has a Ph.D. in Biopharmaceutics from Rutgers University and an MBA from Comell University.
Gary Hattersley, PhD	Chief Scientific Officer	Dr. Hattersley is Chief Scientific Officer of Radius. He has more than 20 years of experience in musculoskeletal research and is the author of numerous scientific publications related to bone biology and physiology. Prior to joining Radius, Dr. Hattersley was with Millennium Pharmaceuticals with responsibility for the discovery and development of novel small-molecule agents for the treatment of osteoporosis and other metabolic bone diseases. Dr. Hattersley also held positions at Genetics Institute/Wyeth Research investigating the application of the bone morphogenetic proteins in bone and connective tissue repair and regeneration. Dr. Hattersley received a PhD in Experimental Pathology from St. George's Hospital Medical School in London.
Mark Durand, MBA	Chief Commercial Officer	Mark Durand has over 25 years of pharmaceutical industry experience in a variety of leadership roles in drug development and commercialization across multiple therapeutic classes and the generics space. Mr. Durand was most recently an independent consultant advising emerging pharmaceutical firms, prior to which he served as CFO for both Watson Pharmaceuticals and Teva Pharmaceuticals North America, in addition to positions of increasing responsibility over an 18-year span with Bristol-Myers Squibb. Mr. Durand received a B.S. in Zoology from Duke University, an M.S. in Biological Sciences from Dartmouth, and an MBA in Finance and Marketing from the University of Chicago.



Financial Performance and Outlook

Radius is a development stage company, and as such, the company has consistently recorded operating losses. In its most recent fiscal year (December 31), Radius did not report revenue, and had a net loss of \$60.7 million, consistent with most development-stage biotechnology companies. Also consistent with other biotechnology companies is large R&D spending relative to G&A expenses. For calendar 2013, Radius recorded R&D expenses of \$60.5 million and G&A of \$6.8 million, both consistent with the prior year's spend of \$55 million and \$9.5 million, respectively, and the bulk of resources primarily attributable to the abaloparatide clinical trial program. The company recorded larger interest income as well as larger other expenses in 2013, but this was largely attributable to lower debt expense and changes in fair value of convertible preferred stock granted to Nordic Bioscience, the company's clinical research contractor for the abaloparatide clinical program.

Exhibit 15. Pipeline Milestones

Date	Candidate	Indication	Milestone
2H:14	Abaloparatide-SC	Osteoporosis	Phase III Data Readout
2H:14	RAD1901	BCBM	Complete MTD/Initiate Phase Ib
2H:14	Abaloparatide-TD	Osteoporosis	Update on Optimization of Patch
2H:15	Abaloparatide-SC	Osteoporosis	NDA Submission
2016	Abaloparatide-SC	Osteoporosis	FDA Approval

Source: Radius Health, Cantor Fitzgerald research

We are forecasting EPS profits in 2018 based on 2016 revenues from abaloparatide-SC. Given that Radius holds both U.S. and European rights to abaloparatide, the company could selectively outlicense the drug, which would likely result in licensing payments and other milestones. We have only modeled U.S. sales of abaloparatide-SC and abaloparatide-TD.

Financings

With a recently completed offering in June 2014, we estimate that Radius has cash in excess of \$50 million, sufficient to fund the company into 2015, in our view. On a pro forma basis, the company has modest debt on its balance sheet (<\$10 million), and roughly 10 million outstanding options and warrants to purchase stock. We expect, pending a positive data read-out of the Phase III abaloparatide trial, that the company will seek additional financing(s).

Exhibit 16: Company Financing History

Issue	Year	Net Proceeds*
Series B redeemable convertible preferred stock	2003 - 2005	\$23,775
Series C redeemable convertible preferred stock	2006 - 2008	\$82,096
Series A-1 convertible preferred stock	2011	\$61,591
Series A-5 convertible preferred stock	2011	\$525
Series B convertible preferred stock	2013	\$42,870
Series B-2 convertible preferred stock	2014	\$27,368
Initial Public Offering	2014	\$59,800
Total		\$298,025

*Numbers in thousands



Valuation

We believe shares of Radius have the potential for valuation expansion to \$20, based on a positive Phase III outcome for abaloparatide.

- **Discounted revenue** Based on the possibility of revenues from U.S. sales of abaloparatide-SC and abaloparatide-TD beginning in 2016, we are forecasting 2020 sales of \$425 million. Using an 8x multiple on revenue and a 30% discount rate, Radius shares could be worth \$20 per share.
- **Discounted EPS** Based on the possibility of positive EPS in 2018 driven by U.S. revenue of abaloparatide-SC and abaloparatide-TD, we are forecasting EPS of \$5.95 in 2020. Using a 40x P/E multiple on our EPS forecast discounted at 50%, we arrive at a \$20 price target.

Risks

Radius Health is a development-stage company, and investment is subject to risk. These risks include but are not limited to:

- Development of new drugs carries a high failure rate, either because the drug in question fails to show efficacy, or significant safety issues arise during the clinical trial process. Additionally, regulatory authorities such as the Food & Drug Administration (FDA) and European Medicines Agency may delay the approval process or reject Radius' clinical findings.
- The clinical landscape is crowded with hundreds of clinical trials. It is possible that other drugs
 will show greater benefit to patients than Radius' candidates, thus rendering potential products
 obsolete or non-competitive. Additionally, drug development is inherently risky, and it is possible
 that Radius' proprietary and partnered candidates will not be associated with successful clinical
 outcomes.
- Radius has rights and patents for its technologies and compounds, many of which have been licensed from third parties. There can be no assurances that such patents will not be subject to challenges, though none are known at this time.
- Radius is not cash flow positive and has not generated profits. There is no guarantee that the company will do so in the near future. The company has roughly \$50 million in cash and has stated that current development plans should allow cash to last into 2015.
- The market is competitive, and we expect potential competitor drugs to abaloparatide to lose
 exclusivity while Radius' drugs are commercially available. There are no assurances that payors,
 either public or private, will adopt Radius' products over generic drugs.
- The market for Radius stock can be volatile, particularly because there is limited history as a publicly-traded company



Exhibit 17: Annual Sales and Earnings

Radius Health, Inc.

All figures in millions, fiscal year ended June 30	2020E	2019E	2018E	2017E	2016E	2015E	2014E	2013A
Revenue	\$424.52	\$281.41	\$204.21	\$100.36	\$43.91	\$0.00	\$0.00	\$0.00
Cost of Goods Sold	53.49	36.86	31.92	17.36	12.30	0.00	0.00	0.00
Gross Profit	\$371.03	\$244.54	\$172.29	\$82.99	\$31.62	\$0.00	\$0.00	\$0.00
Gross Profit Margin	87.40%	86.90%	84.37%	82.70%	72.00%	NM	NM	NM
Operating Expenses								
G&A	45.01	40.55	36.21	31.00	26.91	18.76	8.45	6.83
R&D	72.00	64.80	58.91	52.93	45.63	39.71	58.61	60.54
Total Operating Expenses	117.01	105.36	95.12	83.93	72.54	58.47	67.06	67.37
Profit (Loss) from Operations	\$254.02	\$139.19	\$77.17	(\$0.94)	(\$40.92)	(\$58.47)	(\$67.06)	(\$67.37)
Operating Profit Margin	60%	49%	38%	NM	NM	NM	NM	NM
Interest Income (Expense)	(1.03)	(0.98)	(0.94)	(0.89)	(0.85)	(1.35)	(1.75)	(2.41)
Other Income (Expense)	1.53	1.46	1.39	1.32	1.26	0.90	0.87	9.09
Income (Loss) from Continuing Operations	\$254.52	\$139.66	\$77.62	(\$0.51)	(\$40.51)	(\$58.92)	(\$67.94)	(\$60.69)
Pretax Margin	59.95%	49.63%	38.01%	-0.50%	NM	NM	NM	NM
Income Tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tax Rate	NM	NM	NM	NM	NM	NM	NM	NM
Net Income	\$254.52	\$139.66	\$77.62	(\$0.51)	(\$40.51)	(\$58.92)	(\$67.94)	(\$60.69)
Diluted Earnings (Net Loss) Per Share	\$5.95	\$3.59	\$2.07	(\$0.01)	(\$1.23)	(\$1.88)	(\$2.35)	(\$3.97)
Shares Outstanding	42.76	38.87	37.56	34.62	32.97	31.40	28.94	15.28



Exhibit 18: Balance Sheet Radius Health, Inc.

Assets	2013A	2012A
Cash & cash equivalents	\$12.30	\$18.65
Marketable Securities	0.00	4.00
Prepaid expenses and other	0.33	2.46
Total current assets	\$12.64	\$25.12
Property & equipment, net	0.08	0.14
Other assets	0.05	0.05
Total assets	\$12.76	\$25.30
Liability & Shareholder Equity		
Accounts payable	\$0.30	\$0.55
Accrued expenses	22.01	8.74
Current portion of note payble	13.01	7.80
Total current liabilities	\$35.31	\$17.09
Note payable, net of current portion	0.00	13.01
Warrant liabilities	1.95	0.83
Other liabilities	\$0.00	\$24.39
Preferred stock	252.80	170.65
Common stock	-	-
Additional paid-in capital	-	-
Accumulated deficit	(277.30)	(200.66)
Stockholders' equity (deficit)	(277.30)	(200.66)
Total liabilities & stockholders' equity	\$12.76	\$25.30



Exhibit 19: Statement of Cash Flows

Radius Health, Inc.

Cash Flows from Operating Activities	2013A	2012A
Net loss	(\$60.7)	(\$69.1)
Adjustments to reconcile net loss to net cash used in operating		
activities:		
Depreciation and amortization	0.1	0.1
Stock-based compensation expense	1.5	1.8
Research and development expense	13.1	15.1
Fair value adjustments to warrant liabilities	(9.1)	2.1
Non-cash interest	0.4	0.45
Milestone payment settled with stock	0.00	0.00
Changes in operating assets and liabilities:		
Prepaid expenses and other current assets	1.7	4.6
Other long-term assets	0.0	0.0
Accounts payable	(0.3)	0.24
Accrued expenses and oter current liabilities	8.2	1.6
Net Cash Used in Operating Activities	(\$45.0)	(\$43.2)
Cash Flows from Investing Activities		
Acquisition of property & equipment	(0.0)	(0.0)
Purchases of marketable securities	(17.1)	(19.0)
Sales and maturities of martketable securities	21.0	46.46
Net Cash Used in Investing Activities	\$4.0	\$27.4
Cash Flows from Financing Activities		
Proceeds from exercise of stock options	0.0	0.3
Proceeds from exercise of preferred stock	42.9	0.00
Proceeds from note payable	0.0	12.50
Discount on note payable	0.0	0.0
Deferred financing costs	0.0	(0.03)
Payments on note payable	(8.2)	(3.5)
Net Cash Provided by Financing Activities	\$34.7	\$9.2
Net Increase (Decrease) in Cash & Cash Equivalents	(6.3)	(6.5)
Cash & Cash Equivalents at Beginning of Period	18.7	25.1
Cash & Cash Equivalents at End of Period	\$12.3	\$18.7



Company Description

Radius Health is a development-stage biopharmaceutical firm focused on the commercialization of therapeutics for the treatment of osteoporosis and other serious endocrine-mediated disease.

Companies Mentioned:

3M Co. (MMM - NYSE): NC

Amgen Inc. (AMGN - NASDAQ): NC

Corium International, Inc. (CORI - NASDAQ): NC

Eisai Co., Ltd. (4523 - TSE): NC

Eli Lilly and Company (LLY - NYSE): NC

Ipsen SA (IPN FP - PSE): NC

Merck & Co., Inc. (MRK - NYSE): NC

Novartis AG (NVS - NYSE): NC

Pfizer Inc. (PFE - NYSE): NC

Roche Holdings (ROG.VX - SWX): NC

Bone Therapeutics SA (Private)

Nordic Bioscience (Private)

Seragon Pharmaceuticals, Inc. (Private)

Zosano Pharma Corp. (Private)

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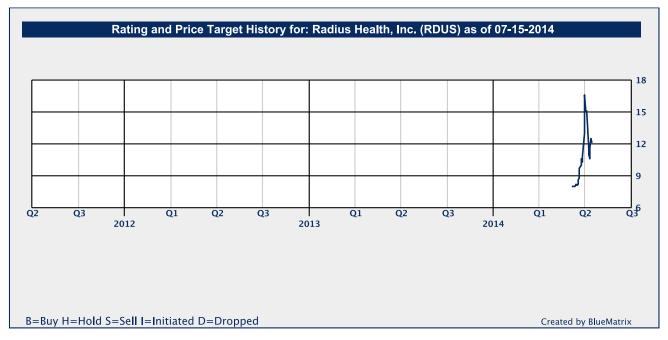
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			Count	Percent
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HOLD [H]	51	34.46	7	13.73
SELL [S]	11	7.43	1	9.09

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