

Equity Research

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## Radius Health, Inc. (RDUS-\$36.04)

**Rating: BUY**

**Target Price: \$58.00**

### NDA for Abaloparatide-SC Coming, RAD1901 Moving Forward - Reiterate BUY

<u>EPS</u>	<u>1Q</u>	<u>2Q</u>	<u>3Q</u>	<u>4Q</u>
2014A	(50.48)A	(2.22)A	(0.59)A	(0.55)A
2015E	(0.47)A	(0.45)E	(0.55)E	(0.54)E
Prev	(0.57)E	(0.47)E	(0.58)E	(0.57)E
2016E	—	—	—	—
<u>REV</u>	<u>1Q</u>	<u>2Q</u>	<u>3Q</u>	<u>4Q</u>
2014A	0.0A	0.0A	0.0A	0.0A
2015E	—	—	—	—
2016E	—	—	—	—
<u>FY</u>	<u>2014A</u>	<u>2015E</u>	<u>2016E</u>	
EPS	(4.04)A	(2.02)E	(1.01)E	
Prev	—	(2.06)E	(1.07)E	
REV	0.0A	0.0E	43.9E	

- **1Q:15 Results.** Radius reported 1Q:14 EPS of (\$0.47), which was better than our forecast of (\$0.57), predominantly on a higher share count. Not surprisingly, however, was a jump in R&D spending, to \$4.7 million from \$2.14 million last year, reflecting Radius' transition from a development-stage company to a commercial organization. We have updated our financial model to include spending assumptions, which include the company's forecast of cash runway through the end of 2016, which is consistent with prior forecasts.
- **Extension Study Results Soon.** The unblinding of the six month extension study of ACTIVE (abaloparatide-SC for severe post-menopausal osteoporosis), should reinforce the clinical results achieved thus far (positive 18 month/Phase III data), and clear the path for NDA submission in the U.S. and Europe in 2H:15. This suggests to us that commercialization is possible next year. With both appealing efficacy and safety, we continue to believe that abaloparatide-SC will be able to take share from the current PTH-based therapeutic, Forteo. Given the strength of the ACTIVE trial results, we think that the extension study is likely to read out positively.
- **Partner Potential of Abaloparatide.** Radius is in partner discussions for abaloparatide-SC (and possibly abaloparatide-TD too), which has been previously discussed and reiterated today. We anticipate a partnership that will bring greater value to the shares and reduce execution risk through the regulatory and early commercialization phase of the drug.
- **RAD1901 Coming into View.** Radius is developing RAD1901, a SERD for the treatment of hormone positive metastatic breast cancer (mBC). A Phase I study is underway in the U.S. for metastatic breast cancer, and we expect an update to be provided at ASCO this month. A trial is also in the works for Europe. In addition, a Phase IIb trial with a low-dose formulation for the treatment of vasomotor symptoms is anticipated later in 2015. While much of Radius' valuation is focused on abaloparatide, we think the opportunity for valuation expansion based on RAD1901 clinical data is high.
- **Valuation.** Our \$58 PT on Radius shares is based on a discounted revenue calculation for abaloparatide-SC of \$52 and \$6 for RAD1901.

#### Current Statistics

Market Cap (\$Mil)	\$1,363.1
Avg. Daily Trading Volume (3 mo.):	419,932
Shares Out (Mil):	37.822
52 Wk. Range	\$51.22-\$7.46

## Summary

Radius Health (Radius) is a development-stage company focused on commercializing treatments for osteoporosis and other serious endocrine-mediated disorders. However, based on the first Phase III results from its abaloparatide program (severe osteoporosis), Radius may have a potential replacement for Forteo, a \$1+ billion drug. Given this potential to have clinically meaningful differentiation versus Forteo (lower rate of hypercalcemia reported in the Phase III, no need for refrigeration), and a relatively short time to commercialization, we believe the opportunity for additional upside exists, particularly as the valuation could expand when the six-month extension study results (24-month fracture data) potentially become known in 2H:15 and/or a commercialization agreement with a partner could also occur at some point. In addition, RAD1901, a SERD for the treatment of hormonally receptive breast cancers and vasomotor symptoms, is included in our model, which we believe can become a larger component of the valuation as the drug and the platform overall advances in development. Our \$58 price target is based on a discounted revenue calculation, based on U.S. revenues of abaloparatide-SC and the inclusion of value for RAD1901. We think there is still additional upside based on what the scope of partnership could be for abaloparatide, including abaloparatide-TD, a transdermal delivery system, that could be an important line extension.

### Exhibit 1: Upcoming Potential Milestones

Date	Candidate	Indication	Milestone
2Q:15	RAD1901	MBC	ASCO presentation
2Q:15	Abaloparatide-SC	Osteoporosis	Phase III 6-month extension/24-month fracture data
2H:15	Abaloparatide-SC	Osteoporosis	NDA, EMEA Submission
2H:15	RAD1901	Vasomotor	Phase IIb Initiation
2H:15	Abaloparatide-TD	Osteoporosis	Initiate clinical program
2015	RAD1901	MBC	Initiate Phase I in EU
2016	Abaloparatide-SC	Osteoporosis	FDA Approval

Source: Radius Health, Cantor Fitzgerald research

## Abaloparatide

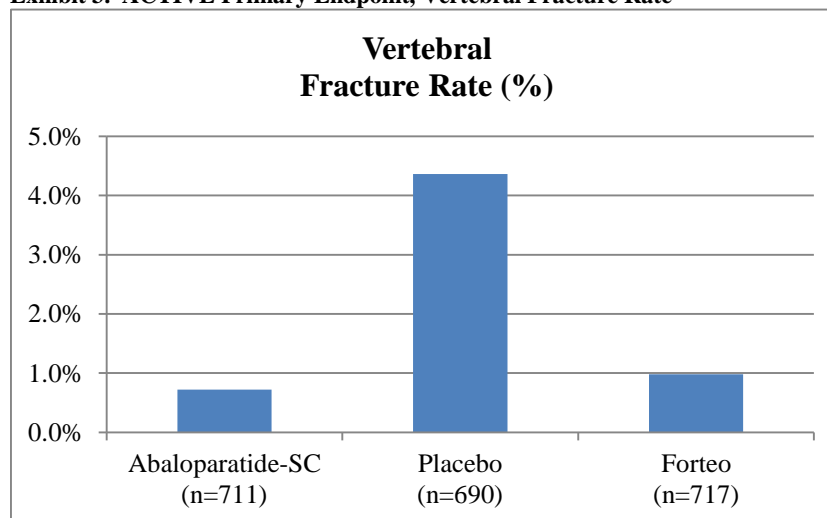
Abaloparatide is a synthetic peptide analog of parathyroid hormone-related protein (PTHrP) that functions as a bone anabolic treatment (grows bone). The 18-month Phase III program was conducted in 2,468 patients across 28 sites in the U.S., Europe, Asia, and Latin America. The drug's profile, we believe, is directly tied to its mechanism as a regulator of bone formation and its selectivity for receptor conformation (R<sup>0</sup>, 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. In the top-line Phase III ACTIVE trial results, hypercalcemia rates were lower in the abaloparatide arm compared to the Forteo arm (6.0% vs. 10.8%).

### Exhibit 2. Review of ACTIVE Phase III Trial, 18-month BMD

Trial Arm	Lumbar Spine			Total Hip			Femoral Neck		
	6 months	12 months	18 months	6 months	12 months	18 months	6 months	12 months	18 months
Placebo	0.60%	0.45%	0.63%	0.31%	0.09%	-0.10%	-0.13%	-0.41%	-0.43%
Abaloparatide-SC*	6.58%	9.77%	11.20%	2.32%	3.41%	4.18%	1.72%	2.65%	3.60%
Teriparatide**	5.25%	8.28%	10.49%	1.44%	2.29%	3.26%	0.87%	1.54%	2.66%

\* p<0.0001 vs. placebo and teriparatide, \*\* p<0.0001 vs. placebo

Source: Radius Health, Cantor Fitzgerald research

**Exhibit 3. ACTIVE Primary Endpoint, Vertebral Fracture Rate**

Source: Radius Health, Cantor Fitzgerald research

The Abaloparatide-SC ACTIVE trial randomized patients 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 six-month extension study (to collect fracture at 24-months), which is expected to read out in 2Q:15. The primary endpoint of the study is new vertebral fractures associated with abaloparatide-SC 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. We expect results to support NDA submission in the U.S. and Europe in 2H:15.

**Exhibit 4. Review of Adverse Events**

Trial Arm	Back Pain	Arthralgia	Upper Respiratory Infection	Hypercalciuria	Dizziness	Hypercalcemia
Placebo	10.0%	9.8%	8.9%	8.9%	6.1%	1.2%
Abaloparatide-SC	8.6%	8.5%	9.0%	10.9%	10.0%	6.0%
Teriparatide	7.2%	8.6%	9.8%	12.5%	7.3%	10.8%

Source: Radius Health, Cantor Fitzgerald research

### 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 both more physician and patient-friendly.** For example, unlike Forteo, abaloparatide-SC will not need refrigeration. 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.

### RAD1901

Licensed worldwide ex-Japan from Eisai in 2006, and just recently (3/9/15) acquiring rights in Japan, RAD1901 is a selective estrogen regulator in development for the treatment breast cancer, with a potential to impact brain metastases, 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.**

- **Vasomotor Symptoms:** A study examining RAD1901 in vasomotor symptoms was conducted in 100 healthy perimenopausal women, evaluating four doses from 10mg to 100mg 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 two to four 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, and will begin such a trial in 2015.**
- **Breast Cancer:** 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, enrolling a Phase Ib study, and will open a second study expected in Europe.** We think there is substantial opportunity in this area, particularly given Roche's acquisition of Seragon, a private company working on drugs with similar mechanism of action, for \$725 million plus \$1 billion in contingent milestone payments.

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## Valuation

We believe shares of Radius have the potential for valuation expansion to \$58. This is based on:

- **Discounted revenue** – Based on the possibility of revenues from U.S. sales of abaloparatide beginning in 2016, we are forecasting 2020 sales of approximately \$425 million. Using an 8x multiple on revenue and a 15% discount rate, Radius shares could be worth \$52 per share.
- **RAD1901** -- Now that a more clear development path of RAD1901 is established, we think the shares should incorporate at least \$200 million, or an additional \$6 per share of value for this candidate.

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## 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 (EMA) 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 \$200 million in cash and has stated that current development plans should allow cash to last into the end of 2016.
- 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 5: Sales and Earnings by Quarter

## Radius Health, Inc.

<i>All figures in millions</i>	2015E	4Q15E	9Mos15E	3Q15E	6Mos15E	2Q15E	1Q15A	2014A	4Q14A	9Mos14A	3Q14A	6Mos14A	2Q14A	1Q14A
<b>Revenue</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
Cost of Goods Sold	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross Profit	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<i>Gross Profit Margin</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>
Operating Expenses														
SG&A	21.57	6.03	15.54	5.77	9.77	5.01	4.76	13.67	5.63	8.05	2.84	5.21	3.07	2.14
R&D	53.43	15.69	37.74	14.82	22.92	11.36	11.56	45.72	11.57	34.15	13.82	20.34	10.62	9.72
Total Operating Expenses	75.00	21.72	53.28	20.59	32.69	16.37	16.32	59.39	17.20	42.20	16.65	25.54	13.69	11.86
<b>Profit (Loss) from Operations</b>	<b>(\$75.00)</b>	<b>(\$21.72)</b>	<b>(\$53.28)</b>	<b>(\$20.59)</b>	<b>(\$32.69)</b>	<b>(\$16.37)</b>	<b>(\$16.32)</b>	<b>(\$59.39)</b>	<b>(\$17.20)</b>	<b>(\$42.20)</b>	<b>(\$16.65)</b>	<b>(\$25.54)</b>	<b>(\$13.69)</b>	<b>(\$11.86)</b>
<i>Operating Profit Margin</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>
Interest (Expense) & Other Income (Expense)	(2.06)	(0.22)	(1.84)	(0.29)	(1.55)	(0.47)	(0.74)	(3.09)	(0.77)	(2.32)	(0.77)	(1.55)	1.08	(1.62)
Unrealized gain from marketable securities	0.06	0.00	0.06	0.00	0.06	0.00	0.06	(0.02)	(0.01)	(0.01)	(0.01)	0.00	0.00	0.00
<b>Pretax Income (Loss)</b>	<b>(\$77.00)</b>	<b>(\$21.94)</b>	<b>(\$55.06)</b>	<b>(\$20.88)</b>	<b>(\$34.18)</b>	<b>(\$16.84)</b>	<b>(\$17.00)</b>	<b>(\$62.50)</b>	<b>(\$17.97)</b>	<b>(\$44.53)</b>	<b>(\$17.43)</b>	<b>(\$27.10)</b>	<b>(\$12.61)</b>	<b>(\$13.48)</b>
<i>Pretax Margin</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>
Accretion of Preferred Stock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(9.00)	0.00	(9.00)	0.00	(9.00)	(4.03)	(4.97)
<b>Net Income (Loss)</b>	<b>(\$77.00)</b>	<b>(\$21.94)</b>	<b>(\$55.06)</b>	<b>(\$20.88)</b>	<b>(\$34.18)</b>	<b>(\$16.84)</b>	<b>(\$17.00)</b>	<b>(\$71.50)</b>	<b>(\$17.97)</b>	<b>(\$53.53)</b>	<b>(\$17.43)</b>	<b>(\$36.10)</b>	<b>(\$16.64)</b>	<b>(\$8.51)</b>
<i>Net Margin</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>
<i>Loss attributable to common, basic &amp; diluted</i>	<i>(\$77.00)</i>	<i>(\$21.94)</i>	<i>(\$55.06)</i>	<i>(\$20.88)</i>	<i>(\$34.18)</i>	<i>(\$16.84)</i>	<i>(\$17.00)</i>	<i>(\$76.50)</i>	<i>(\$22.97)</i>	<i>(\$58.53)</i>	<i>(\$22.43)</i>	<i>(\$36.10)</i>	<i>(\$16.64)</i>	<i>(\$19.46)</i>
<b>Basic &amp; Diluted Net Loss Per Share</b>	<b>(\$2.02)</b>	<b>(\$0.54)</b>	<b>(\$1.48)</b>	<b>(\$0.55)</b>	<b>(\$0.93)</b>	<b>(\$0.45)</b>	<b>(\$0.47)</b>	<b>(\$4.04)</b>	<b>(\$0.55)</b>	<b>(\$4.27)</b>	<b>(\$0.59)</b>	<b>(\$9.11)</b>	<b>(\$2.22)</b>	<b>(\$50.48)</b>
<i>Shares Outstanding</i>	<i>38.08</i>	<i>40.77</i>	<i>37.18</i>	<i>38.10</i>	<i>36.72</i>	<i>37.17</i>	<i>36.27</i>	<i>17.70</i>	<i>32.68</i>	<i>12.54</i>	<i>29.75</i>	<i>3.96</i>	<i>7.50</i>	<i>0.39</i>

Source: Radius Health, Cantor Fitzgerald research

**Exhibit 6: Annual Sales and Earnings**
**Radius Health, Inc.**

<i>All figures in millions, fiscal year ended June 30</i>	2020E	2019E	2018E	2017E	2016E	2015E	2014A
<b>Revenue</b>	<b>\$424.52</b>	<b>\$281.41</b>	<b>\$204.21</b>	<b>\$100.36</b>	<b>\$43.91</b>	<b>\$0.00</b>	<b>\$0.00</b>
Cost of Goods Sold	53.49	36.86	31.92	17.36	12.30	0.00	0.00
<b>Gross Profit</b>	<b>\$371.03</b>	<b>\$244.54</b>	<b>\$172.29</b>	<b>\$82.99</b>	<b>\$31.62</b>	<b>\$0.00</b>	<b>\$0.00</b>
<i>Gross Profit Margin</i>	<i>87.40%</i>	<i>86.90%</i>	<i>84.37%</i>	<i>82.70%</i>	<i>72.00%</i>	<i>NM</i>	<i>NM</i>
Operating Expenses							
G&A	45.01	40.55	36.21	31.00	26.91	21.57	13.67
R&D	72.00	64.80	58.91	52.93	45.63	53.43	45.72
Total Operating Expenses	117.01	105.36	95.12	83.93	72.54	75.00	59.39
<b>Profit (Loss) from Operations</b>	<b>\$254.02</b>	<b>\$139.19</b>	<b>\$77.17</b>	<b>(\$0.94)</b>	<b>(\$40.92)</b>	<b>(\$75.00)</b>	<b>(\$59.39)</b>
<i>Operating Profit Margin</i>	<i>60%</i>	<i>49%</i>	<i>38%</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>
Interest Income (Expense)	(1.03)	(0.98)	(0.94)	(0.89)	(0.85)	(3.00)	(3.09)
Other Income (Expense)	1.53	1.46	1.39	1.32	1.26	0.94	(0.02)
<b>Income (Loss) from Continuing Operations</b>	<b>\$254.52</b>	<b>\$139.66</b>	<b>\$77.62</b>	<b>(\$0.51)</b>	<b>(\$40.51)</b>	<b>(\$77.06)</b>	<b>(\$62.50)</b>
Pretax Margin	59.95%	49.63%	38.01%	-0.50%	NM	NM	NM
Income Tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tax Rate	NM	NM	NM	NM	NM	NM	NM
Net Income	<b>\$254.52</b>	<b>\$139.66</b>	<b>\$77.62</b>	<b>(\$0.51)</b>	<b>(\$40.51)</b>	<b>(\$77.06)</b>	<b>(\$62.50)</b>
<b>Diluted Earnings (Net Loss) Per Share</b>	<b>\$4.91</b>	<b>\$2.96</b>	<b>\$1.70</b>	<b>(\$0.01)</b>	<b>(\$1.01)</b>	<b>(\$2.02)</b>	<b>(\$4.04)</b>
<b>Shares Outstanding</b>	<b>51.86</b>	<b>47.15</b>	<b>45.55</b>	<b>41.98</b>	<b>39.98</b>	<b>38.08</b>	<b>17.70</b>

Source: Radius Health, Cantor Fitzgerald research

## 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:

Eisai Co., Ltd. (4523 - TSE): NC  
Radius Health, Inc. (RDUS - NASDAQ): BUY  
Roche Holdings (ROG.VX - SWX): NC  
Seragon Pharmaceuticals, Inc. (Private)

## Disclosures Appendix

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**BUY:** We have a positive outlook on the stock based on our expected 12 month return relative to its risk. The expected return is based on our view of the company and industry fundamentals, catalysts, and valuation. We recommend investors add to their position.

**HOLD:** We have a neutral outlook on the stock based on our expected 12 month return relative to its risk. The expected return is based on our view of the company and industry fundamentals, catalysts, and valuation.

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**BUY** - denotes stocks that we expect will provide a total return (price appreciation plus yield) of 15% or more over a 12-month period. A BUY rated stock is expected to outperform the total average return of analyst's industry coverage universe on a risk adjusted basis.

**HOLD** - denotes stocks that we suggest will provide a total return or total negative return of up to 15% over 12-month period. A HOLD rated stock is expected to perform in-line with the total average return of the analyst's industry coverage universe on a risk adjusted basis.

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Rating	Cantor		IB Serv./Past 12 Mos.	
	Count	Percent	Count	Percent
BUY [B]	96	62.34	24	25.00
HOLD [H]	52	33.77	9	17.31
SELL [S]	6	3.90	1	16.67