COWEN
AND COMPANY

Biotechnology

Radius Health

Equity Research

Initiating Coverage

July 16, 2014

Price: $12.14 (07/15/2014)
Price Target: NA

OUTPERFORM (1)

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Key Data

Symbol	NASDAQ: RDUS
52-Week Range:	$17.32 - 7.46
Market Cap (MM):	$363.0
Net Debt (MM):	$25.0
Cash/Share:	$2.80
Dil. Shares Out (MM):	30.0
Enterprise Value (MM):	$363.0
ROIC:	NA
ROE (LTM):	NA
BV/Share:	NA
Dividend:	NA

FY (Dec)	2013A	2014E	2015E
Earnings Per Share			
Q1	$(31.25)	$(50.45)A	-
Q2	$(62.59)	$(1.57)	-
Q3	$(65.05)	$(0.55)	-
Q4	$(43.19)	$(0.62)	-
Year	$(203.90)	$(3.95)	$(2.25)
P/E	NM	NM	NM
Revenue (MM)			
Q1	$0.0	$0.0A	-
Q2	$0.0	$0.0	-
Q3	$0.0	$0.0	-
Q4	$0.0	$0.0	-
Year	$0.0	$0.0	$0.0
EV/S	-	-	-

Initiation: A Bone-Tickling Opportunity

The Cowen Insight

We are initiating coverage of Radius Health with an Outperform rating. We view abaloparatide, in Phase III trials for the treatment of osteoporosis, as a low risk development candidate with $400MM+ U.S. commercial potential. We think abaloparatide's injectable market opportunity might be worth $22/share, with additional upside possible pending success from Radius's other pipeline assets.

Abaloparatide: Working To The Bone

Abaloparatide is a synthetic analog of the PTH-related protein that appears to stimulate osteoblast/osteoclast activity in a manner that is differentiated from Eli Lilly's Forteo. A Phase III trial anticipated to read out in late 2014 could provide additional evidence to support the drug's superior efficacy, safety, and convenience profile. As the only marketed anabolic (bone building) agent for osteoporosis, Forteo achieved $1.2B in 2013 worldwide sales. We believe abaloparatide could capture a significant portion of these sales, and that the drug could meaningfully expand the market should a patch-based transdermal delivery system (abaloparatide-TD, in Phase II development) prove successful. With the exception of a single-digit royalty obligation, Radius owns full rights to abaloparatide, and plans to commercialize the drug on its own to U.S. specialists who treat advanced osteoporosis.

RAD1901: Taming Estrogen

RAD1901 belongs to an emerging class of novel cancer therapeutics called selective estrogen receptor degraders (SERDs). SERDs can promote the complete breakdown of the estrogen receptor (ER) in hormonally-driven cancers such as breast, ovarian, and endometrial. As such, they have the potential to be active against tumors that have developed resistance to ER antagonists (e.g. tamoxifen) via point mutations. Within the SERD class, RAD1901 appears unique in being able to cross the blood brain barrier. As such, its development will be directed at ER+ breast cancer patients with brain metastasis, an area of high unmet need and a potential rapid approval pathway. An ongoing Phase I PK/PD trial could provide early proof-of-concept later this quarter.

Bare Bones Valuation Leaves Plenty Of Room For Upside

Radius raised $56MM in a June IPO and is financed into mid 2015, including through Phase III data on abaloparatide. Based on abaloparatide's injectable opportunity in osteoporosis and Radius's net cash position, we view RDUS shares as approximately 80% undervalued relative to the market. Additional upside could be associated with the successful development of abaloparatide's transdermal patch delivery system or RAD1901 for cancer.

At A Glance

Our Investment Thesis

Abaloparatide is a novel PTH mimetic that stimulates osteoblast function in a manner that is differentiated from Forteo. In Phase II studies, abaloparatide demonstrated superior trends relative to Forteo in terms of speed of onset and ability to increase BMD at the spine, hip, and femoral neck. In addition, relative to Forteo, abaloparatide was associated with a lower rate of hypercalcemia. A Phase III trial likely to read out in late 2014 is looking to confirm these benefits. We think abaloparatide's benefits over Forteo could allow the product capture a significant portion of Foteo's $1.2B worldwide market. A transdermal patch formulation (abaloparatide-TD) is in Phase II development, and could further expand the market. RDUS's other clinical candidate, RAD1901, is selective estrogen receptor degrader (SERD) with promising potential in breast cancer and other ER+ driven tumors.

Forthcoming Catalysts

- 18-month fracture data from abaloparatide's Phase III study by year end 2014
- Results from the optimization of abaloparatide-TD's formulation in late 2014
- Data from the Phase I PK/PD study of RAD1901 in healthy volunteers to in late Q3

Base Case Assumptions

- Subcutaneous injection of abaloparatide succeeds in the pivotal Phase III study and receives FDA approval
- Abaloparatide becomes a $400MM+ drug in the U.S.

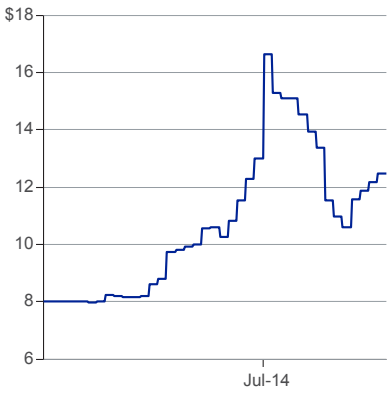
Upside Scenario

- Radius successfully develops abaloparatide-TD, and the patch significantly expands the drug's market
- Radius successfully develops RAD1901 for patients with brain mets

Downside Scenario

- Abaloparatide subcutaneous injection fails in the pivotal Phase III study
- Abaloparatide fails to demonstrate a differentiated clinical profile from Forteo and is not able to compete for market share

Price Performance



Source: Bloomberg

Company Description

Radius is developing abaloparatide, a synthetic analog of the first 34 amino acids of human parathyroid hormone related protein (hPTHrP), for osteoporosis patients with high risk for bone fractures. Abaloparatide increases patients' bone mineral density (BMD) by stimulating osteoblasts to promote new bone formation. In the Phase II proof-of-concept trial, daily subcutaneous injections of abaloparatide demonstrated statistical significant BMD increase as compared to placebo as well as a trend of better efficacy as compared to Forteo (a human recombinant 34-amino acid N-terminal fragment of the parathyroid hormone) from Eli Lilly, the only FDA approved anabolic agent. A pivotal Phase III clinical trial is ongoing with top-line data expected by year end 2014. Radius's second drug candidate RAD1901 functions as a selective estrogen receptor down-regulator (SERD) at a high dose. Radius plans to develop RAD1901 for the treatment of ER-positive breast cancer brain metastases.

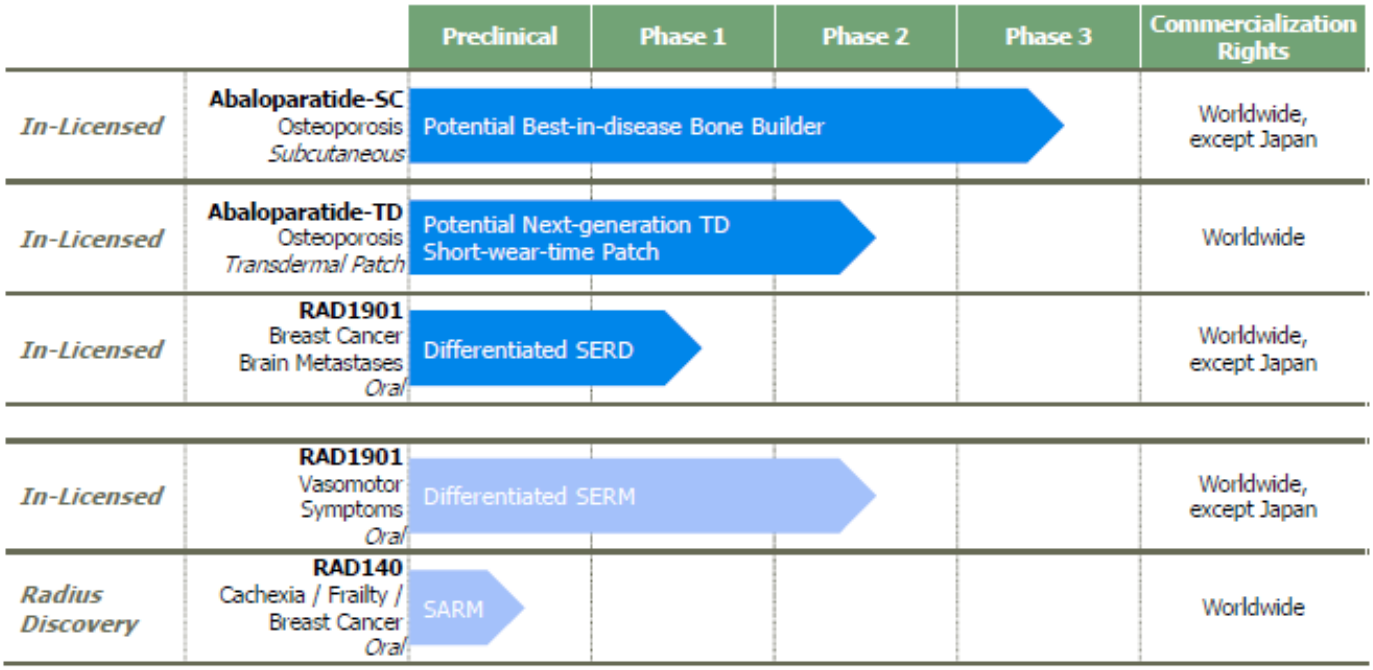
Analyst Top Picks

	Ticker	Price (07/15/2014)	Price Target	Rating
Sunesis Pharmaceuticals	SNSS	$5.73	$NA	Outperform
Relypsa	RLYP	$23.50	$NA	Outperform
Kite Pharma	KITE	$22.44	$NA	Outperform

Investment Summary

Radius Health is a biopharmaceutical company focused on the development of two in-licensed drug candidates. Abaloparatide is a peptide analog of the PTH-related protein in Phase III development for osteoporosis. We believe it may prove directionally superior to Eli Lily's Forteo (a PTH analog), a drug that sold over $1B in 2013. Data from Radius's Phase III trial comparing daily subcutaneous injections of abaloparatide (abaloparatide-SC) to placebo as well as to a reference Forteo arm are expected in late 2014. Abaloparatide is also being developed in Phase II studies as a patch for transdermal delivery (abaloparatide-TD). If successful, this could substantially broaden the product's appeal by removing the need for daily injections, which are required for abaloparatide and Forteo in their current dosage forms. The second candidate RAD1901 is a selective estrogen receptor degrader or SERD for estrogen receptor positive (ER+) breast cancer. SERDs are a relatively new and exciting class of therapeutics that have the ability to treat hormone-resistant tumors. A Phase I trial on RAD1901 in breast cancer patients with brain metastases is expected to begin in H2:14. A third drug candidate, RAD140, is in preclinical development as a selective androgen receptor modulator for cancer and muscle wasting conditions.

Radius Health Pipeline



Source: Radius Health

Abaloparatide: Good To The Bone

Abaloparatide is a synthetic 34-amino acid peptide derived from the parathyroid hormone related protein (PTHrP). Abaloparatide was engineered and initially developed by Ipsen, which retains a modest financial interest in its future potential (5% royalty plus milestones). Abaloparatide was designed to mimic the action of PTHrP, but with pharmaceutical properties that have been optimized in terms of

potency and stability. PTHrP is a hormone that binds to the parathyroid hormone receptor-1 on osteoblasts (bone building cells) leading to their stimulation, as well as the stimulation of osteoclasts (bone resorbing cells) through indirect means. In this regard PTHrP acts much like PTH. However, PTHrP differs from PTH and LLY's Forteo (which is comprised of the first 34 amino acids of PTH) in that it binds to the PTH-1 receptor in a different conformation. The conformational binding of PTHrP (or abaloparatide) to its receptor induces transient receptor signaling, which has the effect of increasing the osteoblast activation. In contrast, the binding of PTH or Forteo to the same receptor drives more prolonged signaling, which can increase the amount of osteoclast signaling, thereby leading to increased bone resorption. It was thought that abaloparatide's lower propensity to stimulate bone resorption relative to Forteo might translate into increased bone formation and lower rates of hypercalcemia.

Abaloparatide's mechanistic advantages relative to Forteo appear to be playing out in the clinic. In a Phase II study, abaloparatide induced changes in spine, hip, and femoral neck bone mineral density (BMD) that were statistically superior to placebo and directionally superior to Forteo, which did not beat placebo in terms of hip or femoral neck BMD. Moreover, abaloparatide induced changes in BMD rapidly, the magnitude of which reached levels similar to those achieved by Amgen's anti-sclerostin antibody. Lastly, abaloparatide administration was safe and well tolerated with 50% lower rates of hypercalcemia than Forteo. Whereas both abaloparatide (40uL via 31-guage needle) and Forteo are each dosed once daily, abaloparatide has the advantage of being room temperature stable while Forteo requires refrigeration. In aggregate, the data on abaloparatide suggest the drug may hold important advantages in terms of efficacy, safety, and convenience relative to Forteo. Results from abaloparatide's Phase III trial are expected in late 2014, and while the trial is not powered to show superior fracture reduction relative to Forteo, we think important advantages in BMD, safety, and convenience will be confirmed.

Abaloparatide Demonstrates Robust Anabolic Effect In Phase II Study

Phase 2 Results	Study-002[1]		
Mean % Change at 24 Weeks	Placebo	Abaloparatide 80 µg^	FORTEO® 20 µg^
Spine BMD	1.57%	6.66%*	5.51%*
Hip BMD	0.39%	2.60%*	0.45%
Femoral Neck BMD	0.79%	3.07%*	1.07%

^ Percent change from baseline
* p<0.05 vs baseline

Source: Radius Health, Inc.

Foreto is the only approved drug for osteoporosis that acts via an anabolic (bone building) mechanism, as opposed to inhibiting bone resorption. The drug is typically used in more severe osteoporosis patients who have failed at least one oral bisphosphonate, and generated worldwide sales of $1.2B in 2013. We think that with a superior overall profile abaloparatide could capture a significant portion of Forteo's market. Radius is planning to launch the drug on its own to U.S. specialists who treat more advance osteoporosis patients, and believes it can address the majority of this

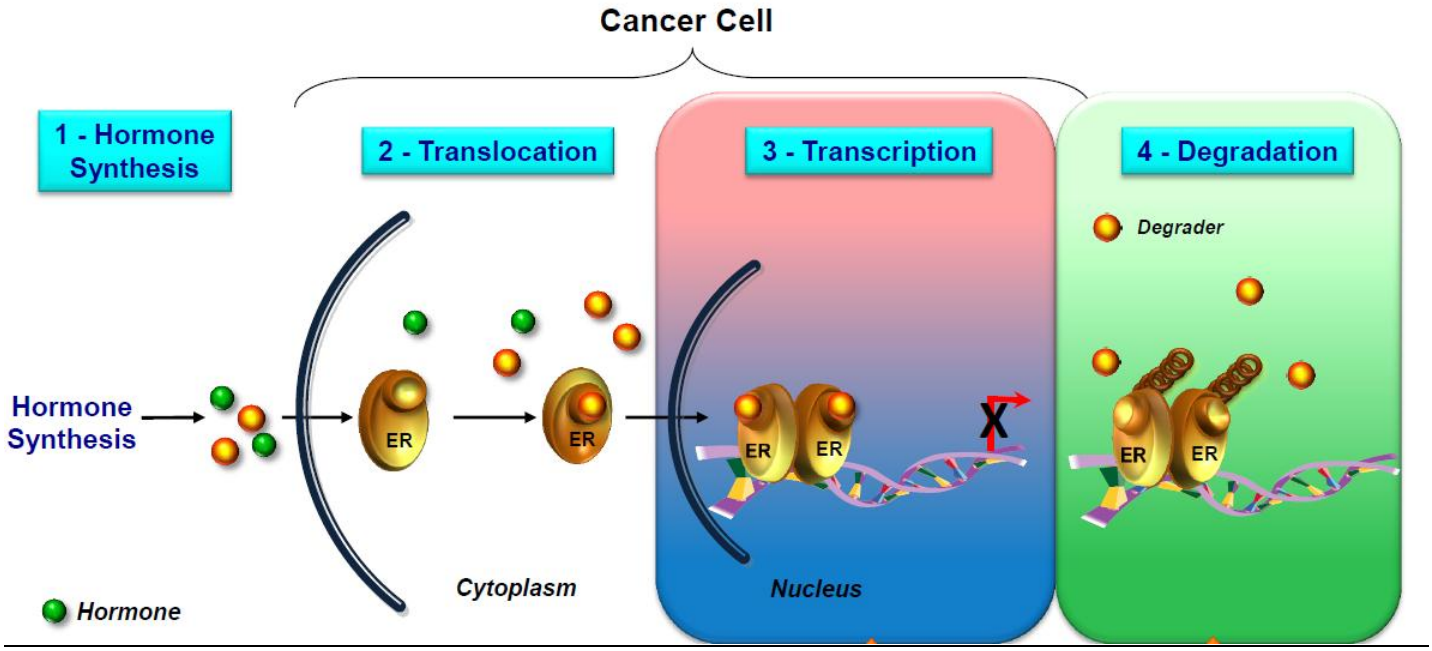
market with a targeted salesforce. We assume a product launch in late 2016 with peak U.S. sales of $400MM+.

While Forteo has been a commercial success, our consultants indicate that only one in three patients to whom they offer the drug actually go onto therapy. Reasons that patients forgo Forteo include (1) the requirement for daily injections, and (2) a boxed warning relating to a preclinical toxicology finding (osteosarcoma in female rats). While abaloparatide's label is likely to feature the same osteosarcoma warning, Radius is seeking to make administration more convenient by delivering abaloparatide via a small transdermal (Microneedle) patch. A Phase II trial has provided some proof-of-concept, though additional formulation work will be needed to achieve optimal blood concentrations. More Phase II studies are planned for 2014-2015. We do not include sales of the patch in our model.

RAD1901: A Somewhat Radical Approach To Breast Cancer

RAD1901 is a small molecule SERD originally designed and developed by Eisai for its ability to cross the blood brain barrier. Radius acquired RAD1901 in 2006 and had been developing RAD1901 as a SERM for treatment of hot flashes (a successful Phase II trial completed in 2010), but shifted development toward ER+ breast cancer once it was discovered that RAD1901 modulated estrogen receptor activity by degrading the receptor. Approximately 80% of breast cancers are driven by overexpression of the estrogen receptor, and SERDs have the ability to treat ER+ cancers after cells become resistant to agents like tamoxifen. Resistance to tamoxifen, a competitive ER antagonist, is often mediated by mutations in the ER receptor, so degradation of the entire receptor would be expected to overcome such resistance. AstraZeneca's Faslodex (2013 sales of $681MM) works via this mechanism, yet it is constrained by poor pharmaceutical properties that limit its potency. Roche's July 2014 acquisition of Seragon, the leading SERD company, for $725MM plus milestones highlights pharma's interest in this emerging therapeutic category. Seragon's lead candidate ARN-810 is still in the early stages of development (Phase I), so Seragon's substantial valuation sets a favorable precedent for RAD1901.

SERD Mechanism Of Action



Source: Seragon Pharmaceuticals

RAD1901 has been previously studied in a 100-patient Phase II study in which post-menopausal women with moderate to severe hot flashes were treated for 28 days. Via this trial, RAD1901 appears safe and capable of penetrating the blood brain barrier, something that no other SERD in development appears able to do. Given this property, it makes sense for Radius to focus its efforts with RAD1901 on ER+ breast cancer patients with brain metastases, an area of high unmet need and a potentially rapid development path. Radius expects to soon start a Phase I trial in healthy volunteers to look at PET imaging to observe ER turnover in the brain. By YE:14 the company hopes to be dosing RAD1901 in a Phase I/II dose escalation trial in cancer patients.

While RAD1901 represents a novel and exciting candidate for a variety of tumor types including ER+ breast, ovarian, and endometrial cancers, proof-of-concept has yet to be established. Hence we do not include the candidate in our model.

Abaloparatide's Late Stage, Low Risk Makes For A Compelling Investment

Radius completed an IPO in June raising gross proceeds of approximately $56MM. Inclusive of $40MM in pro-forma cash as of December 2013, we believe the company is financed to mid 2015 and through several important milestones, including pivotal data on abaloparatide.

Radius Health – Upcoming Milestones/Events

Indication/Milestone	Timing
Results from the Phase I study of RAD1901 in healthy volunteers to identify the maximum tolerated dose	Q3:14
18-month treatment fracture data from the pivotal Phase III study of abaloparatide-SC	Q4:14
Formulation optimization for abaloparatide-TD patch	H2:14
Initiation of Phase Ib trial of RAD1901 in breast cancer patients with brain mets	YE:14
24-month fracture data from the pivotal Phase III study of abaloparatide-SC	Q2:15
NDA and MAA submissions for abaloparatide-SC	H2:15
Potential FDA and EMA approvals for abaloparatide-SC	H2:16
Possible Commercial launch of abaloparatide-SC	YE:16

Source: Cowen and Company

Shares of RDUS have been well received by the public markets, and have appreciated approximately 52% from their IPO offering price. The company sports a market cap of approximately $363MM. While Radius's stock has performed well, we believe there is still much room for upside should abaloparatide succeed in becoming the preferred anabolic agent for osteoporosis and claim much of Forteo's current market share. We estimate the NPV of abaloparatide (injectable only) at $19.20/share. Adding net cash per share of $2.80 suggests Radius might be worth $22/share assuming no contribution from either abaloparatide's transdermal patch or RAD1901. We expect RDUS share to outperform on the basis of positive Phase III data on injectable abaloparatide and developmental progress associated with these other assets.

Abaloparatide (subcutaneous) NPV Calculation

Financial Year End	12/31/2012
Valuation Date	7/14/2014
Discount Rate	**10.0%**
Perpetual Growth Rate	**-5.0%**

Abaloparatide SC NPV

Valuation Date: Monday, July 14, 2014

$MM	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Abaloparatide U.S. Sales	**0**	**0**	**0**	**5**	**70**	**125**	**175**	**250**	**350**	**375**	**400**	**425**	**440**	**453**	**462**	**467**
Growth (%)					*1300%*	*79%*	*40%*	*43%*	*40%*	*7%*	*7%*	*6%*	*4%*	*3%*	*2%*	*1%*
Abaloparatide ex-U.S. Royalties	**0**	**0**	**0**	**0**	**1**	**6**	**15**	**23**	**30**	**41**	**45**	**49**	**53**	**56**	**58**	**59**
Growth (%)					*1300%*	*79%*	*40%*	*43%*	*25%*	*18%*	*14%*	*11%*	*9%*	*6%*	*4%*	*2%*
Total Revenue	**0**	**0**	**0**	**5**	**71**	**131**	**190**	**273**	**380**	**416**	**445**	**474**	**493**	**509**	**520**	**526**
COGS	**0**	**0**	**0**	**1**	**11**	**18**	**23**	**30**	**38**	**39**	**40**	**43**	**44**	**45**	**46**	**47**
Gross Margin					*85%*	*86%*	*87%*	*88%*	*89%*	*90%*	*90%*	*90%*	*90%*	*90%*	*90%*	*90%*
R&D	**48**	**39**	**50**	**47**	**42**	**36**	**30**	**23**	**20**	**18**	**17**	**17**	**17**	**15**	**10**	**10**
R&D as a % of Revenues				*938%*	*59%*	*27%*	*16%*	*8%*	*5%*	*4%*	*4%*	*4%*	*4%*	*3%*	*2%*	*2%*
SG&A	**5**	**9**	**13**	**43**	**64**	**72**	**76**	**80**	**84**	**88**	**96**	**102**	**107**	**115**	**120**	**125**
SG&A as a % of Revenues				*864%*	*90%*	*55%*	*40%*	*29%*	*22%*	*21%*	*22%*	*21%*	*22%*	*23%*	*23%*	*24%*
Operating Income	**(54)**	**(48)**	**(63)**	**(86)**	**(46)**	**6**	**62**	**139**	**238**	**272**	**292**	**313**	**324**	**334**	**344**	**344**
Operating Margin				*-1719%*	*-65%*	*4%*	*32%*	*51%*	*63%*	*65%*	*66%*	*66%*	*66%*	*66%*	*66%*	*65%*
Tax	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**102**	**109**	**113**	**117**	**120**	**120**
Tax rate	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*5%*	*35%*	*35%*	*35%*	*35%*	*35%*	*35%*
Approx Free Cash Flow	**(54)**	**(48)**	**(63)**	**(86)**	**(46)**	**6**	**62**	**139**	**238**	**258**	**190**	**203**	**211**	**217**	**224**	**224**
Years	-0.54	0.46	1.46	2.46	3.46	4.46	5.46	6.46	7.46	8.46	9.46	10.46	11.46	12.46	13.46	14.46
Discount Factor	1.05	0.96	0.87	0.79	0.72	0.65	0.59	0.54	0.49	0.45	0.41	0.37	0.34	0.30	0.28	0.25
NPV of Cash flows	**(57)**	**(46)**	**(55)**	**(68)**	**(33)**	**4**	**37**	**75**	**117**	**115**	**77**	**75**	**71**	**66**	**62**	**56**

Terminal Value Calculation		
Final year FCF		224
Perpetual Growth Rate		-5.0%
Terminal Value		**1,417**
Discount Factor		0.25
Present Value of Terminal Value		**357**
Present Value of Cash Flows		**576**
Enterprise Value		**576**
Fully Diluted Shares Outstanding		30.0
Abaloparatide SC value per share	$	19.20
Net cash/share	$	2.80
Value per share	**$**	**22.00**

Source: Cowen and Company.

Radius Quarterly P&L

	Q1:13A	Q2:13A	Q3:13A	Q4:13A	2013A	Q1:14A	Q2:14E	Q3:14E	Q4:14E	2014E
Abaloparatide-SC U.S. Sales Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Abaloparatide-SC ex-U.S. Royalty Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Revenue	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
COGS	-	-	-	-	-	-	-	-	-	-
GMs										
R&D	17.3	16.2	15.5	11.5	60.5	9.7	11.0	13.0	15.0	48.7
SG&A	1.6	1.4	1.6	2.2	6.8	2.1	2.6	3.0	3.2	10.9
Total Operating Expenses	**18.9**	**17.7**	**17.2**	**13.7**	**67.4**	**11.9**	**13.6**	**16.0**	**18.2**	**59.7**
Income from Operations	**(18.9)**	**(17.7)**	**(17.2)**	**(13.7)**	**(67.4)**	**(11.9)**	**(13.6)**	**(16.0)**	**(18.2)**	**(59.7)**
Op Margins										
Interest and Investment Income	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.5
Other Income (expense)	11.3	(1.2)	(2.6)	1.6	9.1	(2.2)	0.0	0.0	0.0	(2.2)
Interest expense	(0.7)	(0.7)	(0.6)	(0.5)	(2.4)	(0.4)	(0.5)	(0.5)	(0.5)	(1.9)
Net Loss	**(8.3)**	**(19.5)**	**(20.3)**	**(12.5)**	**(60.7)**	**(14.5)**	**(14.0)**	**(16.3)**	**(18.5)**	**(63.3)**
Acretion of Preferred Stock	(3.6)	(4.4)	(4.7)	(4.8)	(17.5)	(5.0)	0.0	0.0	0.0	(5.0)
Pre Tax Earnings (Losses)	**(11.9)**	**(23.9)**	**(25.1)**	**(17.3)**	**(78.2)**	**(19.5)**	**(14.0)**	**(16.3)**	**(18.5)**	**(68.3)**
Tax rate	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Income Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Income (Loss)	**(11.9)**	**(23.9)**	**(25.1)**	**($17.3)**	**($78.2)**	**($19.5)**	**($14.0)**	**($16.3)**	**($18.5)**	**($68.3)**
GAAP EPS	**($31.25)**	**($62.59)**	**($65.05)**	**($43.19)**	**($203.90)**	**($50.45)**	**($1.57)**	**($0.55)**	**($0.62)**	**($3.95)**
Diluted Shares	0.4	0.4	0.4	0.4	0.4	0.4	8.9	29.9	30.0	17.3

Source: Cowen and Company

Radius Annual P&L

	2013A	2014E	2015E	2016E	2017E	2018E
Abaloparatide-SC U.S. Sales Revenue	0.0	0.0	0.0	5.0	70.0	125.0
Abaloparatide-SC ex-U.S. Royalty Revenue	0.0	0.0	0.0	0.0	0.8	6.0
Total Revenue	**0.0**	**0.0**	**0.0**	**5.0**	**70.8**	**131.0**
COGS	-	-	-	0.9	10.5	17.5
GMs	*0%*	*0%*	*0%*	*83%*	*85%*	*86%*
R&D	60.5	48.7	63.0	67.0	70.0	72.0
SG&A	6.8	10.9	16.0	54.0	80.0	90.0
Total Operating Expenses	**67.4**	**59.7**	**79.0**	**121.9**	**160.5**	**180.4**
Income from Operations	**(67.4)**	**(59.7)**	**(79.0)**	**(116.9)**	**(89.8)**	**(49.4)**
Op Margins	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Interest and Investment Income	0.0	0.5	1.0	0.8	0.5	1.0
Other Income (expense)	9.1	(2.2)	0.0	0.0	0.0	0.0
Interest expense	(2.4)	(1.9)	(2.0)	(2.0)	(1.0)	(0.5)
Net Loss	**(60.7)**	**(63.3)**	**(80.0)**	**(118.1)**	**(90.3)**	**(48.9)**
Acretion of Preferred Stock	(17.5)	(5.0)	0.0	0.0	0.0	0.0
Pre Tax Earnings (Losses)	**(78.2)**	**(68.3)**	**(80.0)**	**(118.1)**	**(90.3)**	**(48.9)**
Tax rate	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Income Tax	0.0	0.0	0.0	0.0	0.0	0.0
Net Income (Loss)	**($78.2)**	**($68.3)**	**($80.0)**	**($118.1)**	**($90.3)**	**($48.9)**
GAAP EPS	**($203.90)**	**($3.95)**	**($2.25)**	**($3.15)**	**($2.10)**	**($1.00)**
Diluted Shares	0.4	17.3	35.5	37.5	43.0	49.0

Source: Cowen and Company

Osteoporosis: Boning Up On The Disease

Osteoporosis is a chronic condition that results in low bone mineral density (BMD), reduced bone strength, micro-architectural deterioration, and an increase in fractures. All bones become more fragile and susceptible to fractures as the condition progresses, but the hip, spine, and wrist are most commonly affected. Osteoporosis typically affects postmenopausal women (age >55) and men older than 70 years as lower estrogen/progesterone or testosterone levels can result in increased bone resorption. Additional risk factors include ethnicity (Asians, Caucasians, Hispanics), family history, low body mass, smoking, alcohol consumption, malnutrition, chronic glucocorticoid use (>3 months), concomitant medications, early menopause, vitamin D deficiency, and other medical conditions (i.e., rheumatic, respiratory, hematologic, and infectious). Therefore, osteoporosis is not just confined to the elderly.

According to the National Osteoporosis Foundation, 10 million people (80% of whom are women) in the U.S. have been diagnosed with osteoporosis and another 34 million have low bone mass (osteopenia). It is estimated that 50% of women and 25% of men over the age of 50 will have at least one osteoporotic fracture in their remaining lifetime. Annual direct and indirect costs associated with osteoporotic fractures are around $19 billion but experts estimate that this number could be over $25 billion by 2025 with the annual number of osteoporotic fractures exceeding three million.

According to the National Osteoporosis Foundation, approximately three-fourths of those affected by or at risk for osteoporosis have not sought treatment. Moreover, consultants report that approximately 80% of patients over the age of 67 who have had at least one fracture never get tested or treated for osteoporosis. Reasons for this include low disease awareness, the “silent” nature of the condition (patients don’t feel badly or complain), and lower prioritization of bone health relative to other medical conditions. Hence, the potential for market growth is substantial as physicians and patients become more educated about this disease and the health benefits of pharmacotherapy.

Pathophysiology Of Osteoporosis

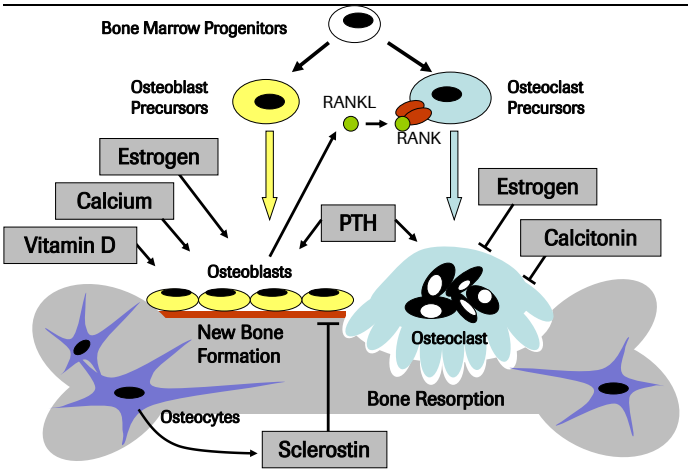
Osteoporosis results from an imbalance between bone resorption and bone formation. Under normal conditions, there is constant bone remodeling: bone marrow derived osteoclast cells resorb bone, after which osteoblast cells build new bone. Either excessive bone resorption or inadequate new bone formation can lead to osteoporosis.

Lack of estrogen is one of the major causes of osteoporosis as it increases bone resorption and decreases new bone deposition. This is the reason for the high prevalence of osteoporosis in postmenopausal women. Calcium and vitamin D deficiency can also impair bone deposition. When serum calcium levels are low, parathyroid glands secrete parathyroid hormone (PTH), a major regulator of calcium homeostasis, to increase bone resorption, thereby raising calcium levels in the blood. Therefore, when administered exogenously at high doses or in a continuous manner for a long period of time, PTH has a catabolic effect that reduces BMD in humans. However, when given intermittently at low doses, PTH can function in the opposite manner and increase BMD. When PTH is administered through daily injections, the serum concentration reaches the peak levels in approximately 30 minutes, after which it returns to non-detectable levels in approximately three hours. Such pattern of exposure to PTH provides stronger stimulation to osteoblasts than to osteoclasts,

resulting in more bone formation than bone destruction. This is the mechanism behind Forteo, an osteoporosis treatment that will be discussed in detail in the following sections of this report.

Calcitonin, a hormone generated by the thyroid, can also decrease bone resorption by binding to receptors on the osteoclast surface and inhibiting osteoclastic activity. Bone resorption can also be blocked by inhibiting the receptor-ligand binding between the osteoclast receptor RANK (receptor activator for nuclear factor κB) and its ligand, RANKL. RANKL is produced by osteoblasts and, when bound to RANK, stimulates osteoclasts and increases bone resorption. Lastly, another protein that has important function in regulating bone remodeling is sclerostin, a glycoprotein secreted by osteocytes that inhibits bone formation by osteoblasts. Mice that do not produce sclerostin have very high bone mass while mice with an over-production of this protein have severe bone loss. Clinical studies have also shown that inhibition of sclerostin leads to increased bone formation in humans.

Bone Resorption vs. Bone Formation



Source: Cowen and Company

Diagnosis And Treatment: Osteoporosis From "T to Z"

BMD is used to assess the severity of osteoporosis by calculating "T"- and "Z"-scores. T-scores are derived by comparing a patient's BMD with the young adult mean. Healthy people have BMD T-scores within one standard deviation (-1.0 to +1.0) of the young adult mean, whereas patients with osteoporosis have T-scores below -2.5 and patients with osteopenia (low bone mass) have T-scores between -1.0 and -2.5. The Z-score is a different method of assessing disease severity, and compares the amount of actual versus expected bone loss for patients of similar sex and age. Although the gold standard for initial diagnosis is the measurement of BMD by dual energy X-ray absorptiometry (DXA) scans, evidence suggests that other factors should also be considered in determining when to initiate treatment for osteoporosis. In 2008, the National Osteoporosis Foundation issued guidelines that included the use of an algorithm, which combines DXA scan results with nine other clinical risk factors, to assess a patient's 10-year fracture probability and thus whether or not treatment should be initiated.

BMD is commonly used as the primary endpoint in Phase II studies to establish the minimal effective dose and dose-response curve. However, when it comes to

guidelines on how to evaluate efficacy of therapeutics in registration studies for osteoporosis, the FDA and EMA require fracture evaluation data for non-estrogen therapies (the reduction in risk of vertebral and non-vertebral fractures by estrogen therapy has been demonstrated in epidemiological studies). An agent in development is expected to demonstrate statistically significant reduction in vertebral fracture frequency as compared to placebo controls. Likewise, the CHMP requires reduction of new fractures to be the primary efficacy endpoint and does not consider BMD to be an appropriate surrogate endpoint.

Anti-Resorptives vs. Anabolics

Since osteoporosis can result from either excessive bone resorption or inadequate bone formation, available therapeutics for the treatment of osteoporosis are tackling the condition from two fronts. Therapeutics for osteoporosis can be largely divided into two groups: those that are used to inhibit bone resorption and those used to stimulate bone growth. Most available therapeutics, such as bisphosphonates, hormone replacement therapy (HRT), selective estrogen receptor modulators (SERMs) and a RANKL inhibitor, fall into the first category whereas the second category consists solely of recombinant parathyroid hormone (rPTH).

Bisphophonates: Multiple Cheap Options Available, But Still Unmet Need

Bisphosphonates are nearly always the drug class of first choice to treat osteoporosis. Within this class, generic alendronate (available since 2008, branded as Fosamax from Merck) is the most widely prescribed given its solid efficacy, available long-term safety data and convenient oral delivery (once-weekly pill or liquid solution). Other products in this class include risedronate (Actonel and Atelvia, both from Sanofi/Warner Chilcott with the latter being a delayed release formulation) and ibandronate (Boniva, Roche, and generics). However, oral bisphosphonates are poorly absorbed through the GI tract and therefore must be taken on an empty stomach with eight ounces of water. Patients must then remain upright for 30 to 45 minutes, and despite these precautionary measures, 20% or more of patients report GI upset ranging from mild heartburn to severe esophagitis that requires clinical intervention.

The GI tolerability issue significantly impacts patient compliance to oral bisphosphonates. A survey conducted by the International Osteoporosis Foundation suggests that the discontinuation rate within one year after treatment initiation can be up to 60% in patients who take once-weekly bisphosphonates and up to 80% in those who follow a once-daily regimen. In part to circumvent this issue, Novartis developed Reclast, a formulation of zoledronic acid dosed via IV infusion once per year. However, the altered dosing regimen cannot avoid another infrequent but potential serious side effect associated with bisphosphonates: osteonecrosis of the jaw (ONJ).

ONJ is a condition in which the jaw fails to heal after dental trauma or surgery. As a result, the jaw bone becomes exposed and susceptible to infections, which can cause the serious morbidity. ONJ is likely the result of over-suppression of normal bone turn over due to impaired osteoclast function and compromised blood flow. Based on the many cases reported in 2003 and 2004, in January 2005 the FDA asked Merck to revise the Fosamax label to include a warning about a possible relation between the drug and ONJ. In July 2005, the same warning was added to other bisphosphonate labels per the FDA's request.

In October 2010, the FDA further required a label change for bisphosphonates to caution patients and physicians about an increased risk of atypical fractures of the

thigh, known as subtrochanteric and diaphyseal femur fractures. Although the incidence of this type of fractures is low, accounting for less than 1% of all hip and femur fracture, and their cause is not well understood, they nevertheless have been predominantly reported in patients taking bisphosphonates.

Additional adverse events associated with the use of bisphosphonates in osteoporosis include atrial fibrillation, anomalous fractures resulting from frozen bone syndrome and potentially an increase in the incidence of chronic esophagitis and its resulting complications. All these concerns constitute hurdles to desirable compliance and the FDA also stated that additional studies are required to determine the long-term risks and benefits of bisphosphonate use. According to our physician consultants, most patients are treated for approximately five years with bisphosphonates, after which they take a drug holiday until disease progression.

Bisphosphonates Have Limited Efficacy On Hip And Non-Vertebral Fractures

Anti-resorptive therapies such as bisphosphonates are very effective for the prevention of vertebral fractures (50-70% reduction). However, physicians consider them only modestly effective at preventing hip fractures (30-40% reduction) and mildly effective at preventing other clinical non-vertebral fractures. Impaired efficacy at the hip and other sites is important as these fractures are associated with significant health care complications and costs. For example, the five-year mortality rate is 25% in people with a hip fracture as compared to 17% of people with a vertebral fracture. After a hip fracture, 20% of patients require long-term nursing care and 15% of patients require assistance with ambulation. And a first hip fracture increases the risk of a second hip fracture by four fold.

Other Anti-Resorptives Have Their Drawbacks

Prolia (denosumab) from Amgen is a humanized monoclonal antibody that inhibits the RANK/RANKL interaction. By binding to RANKL, Prolia prevents the ligand from binding to and stimulating RANK receptors located on osteoclast precursor cells, and thereby prevents osteoclast precursor cells from differentiating into functioning osteoclasts that resorb bone. The RANK/RANK ligand pathway also plays a crucial role in mediating osteoclast survival. By inhibiting this interaction, mature osteoclast cells are directed toward apoptosis (cell death). Therefore, Prolia inhibits osteoclast formation and function. Prolia is administered through subcutaneous injection every six months and has demonstrated higher efficacy than bisphosphonates in increasing bone mineral density at all sites in patients with osteoporosis.

Prolia received FDA approval in June 2010 and offers patients a convenient option of once every six month injection. However, RANKL is expressed on activated T cells and B cells in lymph nodes, so a RANKL inhibitor carries in theory an increased risk of infection. A significant higher number of patients treated with Prolia developed skin infections (erysipelas and cellulitis) and irritations (dermatitis, eczema, and rashes) in Phase III trials. In addition to warnings against serious infections and dermatologic reactions, Prolia's label also states that ONJ has been reported with Prolia.

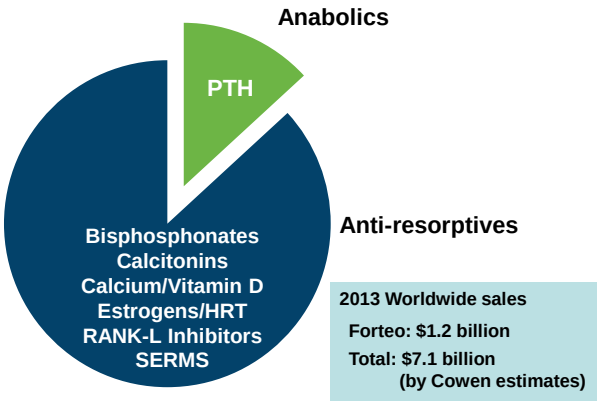
Synthetic calcitonin is associated with only modest efficacy. It is often available in the formulation of nasal spray, a non-optimal route of administration for many patients. Estrogen, a type of hormone replacement therapy (HRT), is predominantly used for short-term due to the increased risk of cancer and other risks including myocardial infarction and stroke. A number of synthetic SERMs (selective estrogen receptor modulator) are in used in clinical practice. In contrast to pure estrogen receptor

agonists or antagonists, these non-hormonal agents have selective estrogen agonism or antagonism properties on target tissues. In general, SERMs have favorable estrogen-like activity on bone, vasculature, and lipid parameters, while displaying anti-estrogen action on reproductive tissues, including breast and endometrium. However, SERMs are less efficacious than estrogen.

Anabolics: "Osteoblast"ing Their Way To The Bone

For patients with osteoporosis, anti-resorptives that function through reducing bone loss can provide a moderate effect in restoring bone mass and preventing fractures. However, many patients fail to respond to bisphosphonates while others have difficulty tolerating them. For patients with moderate to severe disease, anabolic agents that induce a faster and greater return of the bone mass can often provide a more desirable approach. Our physician consultants believe that relative to anti-resorptive agents that increase BMD by "filling in the cracks", anabolic agents have the potential to reduce fracture risk more substantially. Forteo (teriparatide) from Eli Lilly, a human recombinant 34-amino acid N-terminal fragment of the parathyroid hormone (rPTH (1-34)), is the only approved agent that builds bone primarily by increasing the activity of osteoblasts. Forteo's differentiated mechanism of action and strong efficacy profile provide it with an important niche in the treatment paradigm.

Therapeutics For Osteoporosis



Source: Radius Health, Inc. & Cowen and Company

Forteo Has Demonstrated Strong Efficacy

Forteo received FDA approval in November 2002 for the treatment of osteoporosis in postmenopausal women who are at high risk for fracture, and to increase bone mass in men with osteoporosis who are at high risk for fracture. The safety and efficacy of Forteo was evaluated in a double-blind, placebo-controlled pivotal study that enrolled 1,637 postmenopausal women with osteoporosis. Patients randomized to Forteo had a median exposure of 19 months to the drug and all patients received concomitant calcium and vitamin D. Forteo treatment resulted in a statistically significant reduction in the percent of patients who experienced one or more new vertebral fractures as compared to placebo (5.0% vs. 14.3%, $p<0.001$). Likewise, Forteo treatment reduced the risk of nonvertebral fracture with statistical significance as compared to placebo (2.6% vs. 5.5%, $p<0.05$).

The results from Forteo's registration study compare favorably with those from the studies that supported Fosamax's FDA approval. Nevertheless, patients are almost always first treated with oral bisphosphonates prior to Forteo, given their lower cost and oral route of administration.

Forteo vs. Fosamax In Fracture Reduction

	Percent of Women With Fracture				
	Forteo*	Placebo	Absolute Reduction in Fracture Incidence	Relative Reduction in Fracture Risk	p Value
New vertebral fractures (≥ 1)	(n=444)	(n=448)			
	5.0	14.3	9.3	65%	p<0.001
	Fosamax**	Placebo			
	(n=1022)	(n=1005)			
	7.9	15.0	7.1	47%	p<0.001

* Median exposure of 19 months; 90% of patients in the study had one or more vertebral fractures are baseline
** A three-year study of daily dosing in patients with at least one baseline vertebral fracture

Source: Forteo Label, Fosamax Label & Cowen and Company

Forteo Has Grown Into A Billion Dollar Drug

Eli Lilly launched Forteo in 2003. A pen injector was approved and launched in mid-2008 and Forteo received EMEA and FDA approvals for the indication of glucocorticoid-induced osteoporosis (GIOP) in February 2008 and in July 2009, respectively. 2013 worldwide sales reached $1.2 billion, with approximately $511 million coming from the U.S. market and the rest from ex-U.S. territories.

U.S. And Worldwide Sales Of Forteo

Year	U.S. ($MM)	Y/Y Growth	Ex U.S. ($MM)	Y/Y Growth	Total ($MM)	Y/Y Growth
2003	N/A		N/A		$65.3	
2004	N/A		N/A		$238.6	265.4%
2005	$264.7		$124.6		$389.3	63.2%
2006	$416.2	57.2%	$178.1	42.9%	$594.3	52.7%
2007	$494.1	18.7%	$215.2	20.8%	$709.3	19.4%
2008	$489.9	-0.9%	$288.8	34.2%	$778.7	9.8%
2009	$518.3	5.8%	$298.4	3.3%	$816.7	4.9%
2010	$499.0	-3.7%	$331.0	10.9%	$830.0	1.6%
2011	$453.1	-9.2%	$496.7	50.1%	$949.8	14.4%
2012	$488.2	7.7%	$662.8	33.4%	$1,151.0	21.2%
2013	$511.4	4.8%	$733.5	10.7%	$1,244.9	8.2%

Source: Eli Lilly & Cowen and Company

The strong growth in Forteo sales has been achieved despite multiple barriers to its use, which include its high cost (current WAC of $1,545.00 for 600mcg/2.4ml translates into a daily cost of $51.50), the need for daily injections, a requirement for refrigeration, and a limited duration of dosing (24 months in U.S. and 18 months in Europe) due to potential risk of osteosarcoma.

Osteosarcoma Risk May Be Exaggerated

Forteo's label carries a black box warning due to increased incidence of osteosarcoma observed in a preclinical toxicology model. Forteo administered at three to 60 times the equivalent dose of 20mcg for human patients increased the incidence of osteosarcoma in a dose dependent manner. In rats that received the highest dose (75mcg/kg/day), osteosarcoma was detected in 45% of the animals. Animals that received higher doses showed exaggerated skeletal response and marrow obliteration.

We do not believe osteosarcoma is a significant risk in human patients treated with Forteo for the following reasons. First, the specific strain used in the toxicology and carcinogenicity studies, the Fischer 344 rat, has a higher spontaneous osteosarcoma rate: 1 to 3 per 1,000 as compared to 4.5 in 1,000,000 in human beings. Additionally, at higher doses and for a much prolonged treatment period, the rats received significantly elevated exposure to Forteo than human patients would receive at the FDA approved dose and for the specified 24-month treatment period. Thirdly, over 2,000 patients received Foreo treatment in clinical trials and no osteosarcoma was detected. And lastly, post-approval studies to date have suggested no increased rate of osteosarcoma in human patients. Lilly initiated an Osteosarcoma Surveillance Study in 2003 to evaluate the potential causal association between Forteo treatment and osteosarcoma. In this on-going study, adult patients with primary osteosarcomsa that are diagnosed on or after January 1, 2003 are identified in the U.S. and are confirmed for prior treatment with Forteo. After seven years of study, no osteosarcoma patients with a prior history of Forteo treatment have been found. In addition, Lilly initiated a Forteo patient registry in July 2009 and as of March 31, 2014, 40,561 patients had signed up. The results from the registry study are reviewed by the Osteosarcoma Surveillance Study Advisory Board on a quarterly basis and are also shared with the FDA at least annually. The long-term study is expected to be completed in 2022.

Despite the lack of proven association between Forteo and osteosarcoma in human, we do not expect the FDA to remove the black box warning from the drug's label. This reflects the agency's conservative approach to drug safety. We believe the warning may continue to present a modest barrier to physicians' and patients' adoption of Forteo.

Second-Line Treatment Market Is Expanding Rapidly

Generic oral bisphosphonates remain the front-line treatment for osteoporosis, in large part due to managed care considerations. The majority of patients are treated for osteoporosis by their primary care doctors and typically a patient is referred to specialists for other treatment options only after failing/becoming intolerant to oral therapy. Our physician consultants believe that approximately 20% of patients become intolerant to oral bisphosphonates due to GI disturbance at some point in their course of therapy. For these patients, injectables that bypass the GI tract are an option. Growing sales of Forteo, Reclast (peak U.S. sales of approximately $360 million in 2012, the last full year of patent protection), and Prolia (worldwide sales in the following chart) suggest that high failure rate and intolerability continue to be major issues associated with oral bisphosphonates and that the market potential is significant for second-line osteoporosis therapies.

U.S. And Worldwide Sales Of Prolia

Year	U.S. ($MM)	Y/Y Growth	Ex U.S. ($MM)	Y/Y Growth	Total ($MM)	Y/Y Growth
2011	130		73		203	
2012	292	124.6%	180	146.6%	472	132.5%
2013	462	58.2%	282	56.7%	744	57.6%

Source: Amgen

From our discussions with physicians, we believe the factors that contributed to the increased sales of both Forteo and Prolia include both drugs' demonstrated efficacy, improved physician comfort levels with safety, better insurance coverage (particularly Medicare Part D), and elevated awareness. All these factors should also create a favorable market environment for abaloparatide, in our opinion.

We believe that the treatment paradigm for osteoporosis will continue to evolve with more treatment options becoming available. The following chart summarizes the currently available treatment options for osteoporosis. We believe there is still a significant need for more potent therapeutics with improved tolerability to enhance compliance, particularly drugs with anabolic activity.

Approved Therapeutics For Osteoporosis

Drug Class	Mechanism of Action	Pros	Cons
Anti-resorptives			
Bisphosphonates Generic alendronate Actonel (Sanofi) Generic ibandronate Generic zoledronate Atelvia (Warner-Chilcott) Generic pamindronate	- Limit bone breakdown and slow bone removal by inhibiting osteoclast activity	– Solid efficacy (Increased bone mass density) – Plenty of long-term data – Oral – Low cost (generics available)	– Poor bioavailability – Side effects, primarily gastrointestinal; rare incidence of ONJ, atypical femoral fractures (class boxed warning) – Possible association with atrial fibrillation and adynamic bone – Poor long term compliance
RANK Ligand inhibitors Prolia (Amgen)	- Inhibit bone resorption by blocking osteoclast formation and function	– Convenient semiannual, subQ dosing – Comparable efficacy and safety to bisphosphonates, but with reversible effects	– Increased risk of infections – Limited long-term safety data – Labeled only for high-risk patients – Expensive ($1,650/year)
Calcitonins Miacalcic (Novartis)	- Naturally secreted by the thyroid gland. Increases deposition of calcium and phosphate in the bone while lowering calcium levels in blood	– Useful in premenopausal women or patients who cannot tolerate or refuse to take bisphosphonates, ERTs, and SERMs – Available in nasal spray and injection	– Modest and more short term efficacy in comparison to bisphosphonates, ERTs, and SERMs – Safety issues (rare cases of ONJ) – High cost ($1,650/year)
Estrogens/ HRT Premarin (Wyeth)	- Estrogens reduce bone resorption by reducing bone breakdown	– Very effective single modality for osteoporosis prevention – Cost effective at approximately $200/year	– Potentially increases the risk of cancer in some women – Contraindicated in patients in certain females with or at risk to certain cancers, thrombosis – Compliance an issue due to side effects (breast tenderness, migraine, resumption of periods, etc.)
Selective Estrogen Receptor Modulators (SERMs) Evista (Lilly)	- Stimulate certain estrogen receptors that prevent bone destruction and block uterine estrogen receptors, tempering the unfavorable side effects of ERTs	– Increase bone mass density – Favorable lipid effects: decrease total and LDL cholesterol by approximately 10%; no increase in HDL – Reduction in breast cancer	– Less efficacious than estrogens – Increased risk of thrombosis
Anabolics			
Parathyroid Hormones (PTH) Forteo (Lilly)	- Naturally secreted hormone PTH stimulates bone formation (via osteoblasts)	– Unique bone-building properties	– Expensive, daily injectable – Tumors detected in rat bone and in 1 reported case WW – Patient can take for only 2 years

Source: National Osteoporosis Foundation, PDR, Stedman's Medical Dictionary, Cowen and Company

Abaloparatide: A Better "PTH"

Radius is developing abaloparatide (formerly known as BA058), a novel synthetic analog of the first 34 amino acids of human parathyroid hormone-related peptide (hPTHrP, 1-34), as a potentially better anabolic therapeutic for the treatment of osteoporosis. Abaloparatide was identified by Ipsen from a functional assay designed to identify drug candidates with strong anabolic activity and Radius licensed the exclusive worldwide rights (except Japan) from Ipsen in 2005. The first 24 amino acids in abaloparatide have the identical sequence to the natural peptide but the remaining ones are substituted with non-natural amino acids to improve temperature stability and to further enhance anabolic activity.

Unlike PTH which is secreted in the endocrine system and is a major regulator of calcium homeostasis, PTHrP functions in a local paracrine/autocrine manner and influences fetal bone development. Mice that do not have PTH protein expression show increased trabecular (spongy) and cortical (hard) bone formation. In contrast, mice that are deficient in PTHrP production show decreased trabecular and cortical bone formation. Therefore, the major physiological function of PTH is to stimulate bone resorption whereas PTHrP has "true" anabolic activity to stimulate bone formation.

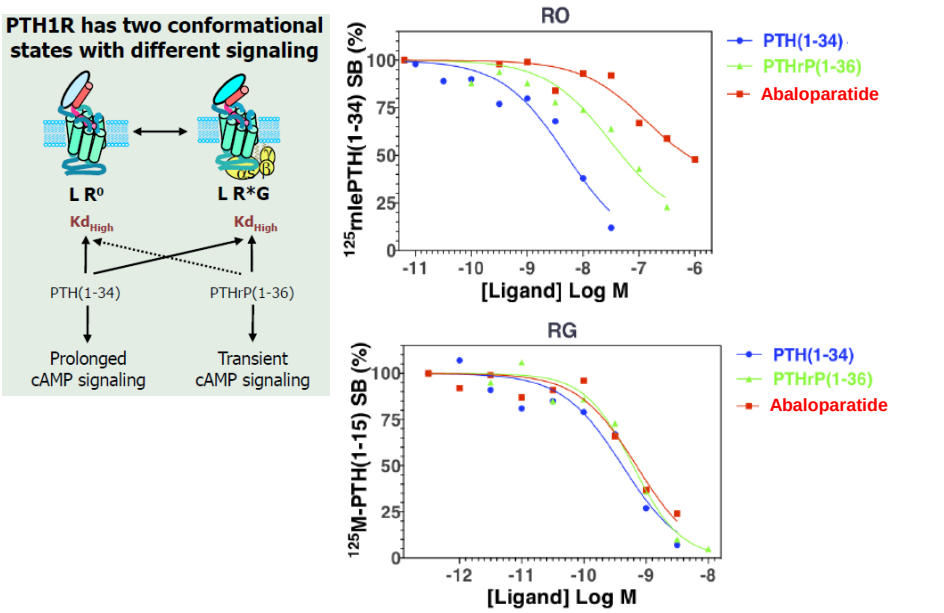
hPTHrP shares some structural similarity with hPTH in the bioactive amino-terminal region, an area that mediates their binding to the same Type I PTH receptor (PTHR1). However, hPTHrP and hPTH bind to the receptor in different ways and this difference looks to be the reason for abaloparatide's differentiated clinical profile.

Abaloparatide Demonstrates Differential Receptor Binding Selectivity

PTH1R is a G protein-coupled receptor (GPCR) that can adopt two different conformations: a G protein-coupled conformation (RG) and a G protein-uncoupled conformation (R^0). The binding affinity of RG to ligands is dependent on G protein coupling whereas R^0 can form a stable complex with ligands even upon G protein dissociation. Different ligands, depending on their structures, display different affinities to these two conformations.

Radius conducted competition binding studies to characterize abaloparatide's binding affinity to these two receptor conformations. The studies confirmed previous findings that both PTH(1-34) and PTHrP(1-36) bound to the RG conformation with similarly high affinities but that the affinity between PTHrP(1-36) and R^0 is much lower. Radius further discovered that abaloparatide binds RG with an equally high affinity as compared to PTH(1-34) and PTHrP(1-36) but its affinity to R^0 is even lower than PTHrP(1-36). Therefore, abaloparatide demonstrates an even higher binding selectivity than PTHrP(1-36).

Abaloparatide Demonstrates Differential Binding Selectivity To PTH1R

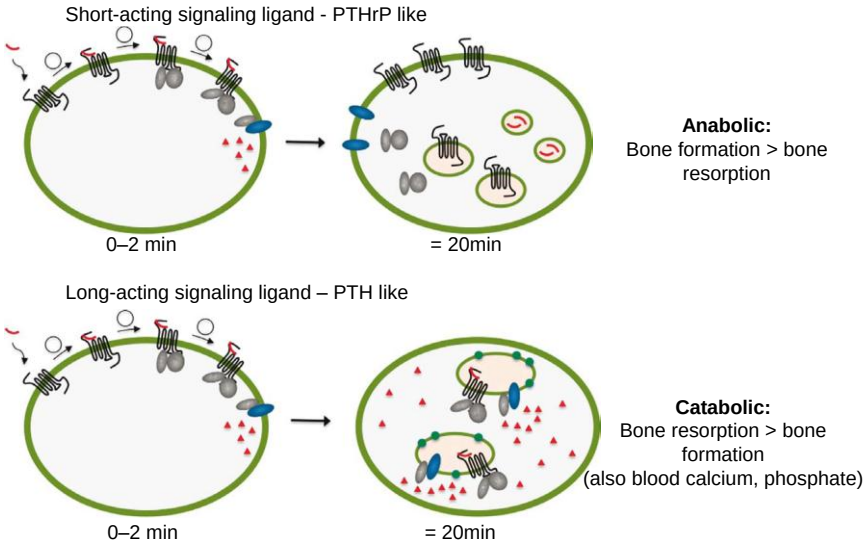


Source: Radius Health, Inc.

Due to distinct binding selectivity to the two receptor conformations, abaloparatide (hPTHrP-like) induces different downstream signaling than Forteo (hPTH-like). hPTH forms a more stable complex with the receptor to induce a more prolonged receptor activation and a more durable cAMP response inside the cells. This explains its ability to increase bone resorption and calcium levels in blood. In contrast, hPTHrP's action is limited to the plasma membrane. Upon entering cells, hPTHrP rapidly and completely dissociates from the receptor and only induces a transient activation of the downstream signaling pathway. Therefore, hPTHrP has significantly less calcium mobilizing activity and induces less bone resorption than hPTH.

The difference in receptor binding mechanism has important clinical implications for abaloparatide and Forteo. Forteo stimulates both osteoblasts and osteoclasts. It induces more bone resorption upon chronic exposure, and has a propensity to cause hypercalcemia. Abaloparatide's high receptor binding selectivity results in less bone resorption and elevation of serum calcium level. Therefore, the drug candidate has the potential to become a more potent anabolic agent with an improved safety profile.

Abaloparatide Is A Short-Acting Signaling Ligand



Source: Radius Health, Inc.

Clinical Trials Tell The "Bone" Fide Truth

Abaloparatide is being studied in an ongoing pivotal Phase III clinical trial with top-line data expected by year end 2014. Phase I and II clinical trials that have been completed demonstrate a strong safety and efficacy profile. The results suggest that abaloparatide treatment may lead to improved clinical benefit as compared to Forteo. Similar to Forteo, abaloparatide is administered through daily self-injection using an auto-injector that contains a 31-gauge needle. The volume of solution for each injection is 40μl for abaloparatide as compared to 80μl for Forteo.

Phase I Trials Demonstrated The Bioavailability Of Abaloparatide

Phase I studies demonstrated safety and bioavailability of subcutaneous injections of abaloparatide. A single-dose Phase I clinical trial in healthy male and female subjects investigated subcutaneous doses from 5mcg to 120mcg, and determined that abaloparatide was well-tolerated up to 80mcg and was 100% bioavailable. Subsequently, two multi-dose Phase I PK/PD studies in healthy postmenopausal women concluded that abaloparatide had a maximal tolerated dose of 100mcg and demonstrated that abaloparatide induced early changes in bone formation markers but with limited hypercalcemia and other safety risks.

Phase I Trials For Abaloparatide

Phase I Single Dose PK and Bioavailability Trial		
Enrollment	**Protocol**	**Results/Safety**
N = 96 Heathy male and female subjects > 55 years of age	Single Center **Part A:** Randomized, double-blind, dose escalating, parallel groups, placebo controlled; **Part B:** Randomized, open-label, two-period, cross-over design Subcutaneous doses of 5mcg to 120mcg	• Well-tolerated up to 80mcg • 100% bioavailable • Approximately dose-proportional kinetics • No significant findings identified in cardiac safety monitoring

Phase I Repeated Dose 7-day PK/PD Trial		
Enrollment	**Protocol**	**Results/Safety**
N = 39 Heathy postmenopausal women 55 to 73 years of age	Single Center Randomized, double -blind, ascending multiple-dose, placebo controlled A second study investigated a new liquid formation presented as a pre-filled multi-dose cartridge	• Well-tolerated up to 100mcg • 100mcg maximal tolerated dose • Induced early changes in bone formation markers • Limited hypercalcemic effect; no significant findings identified in cardiac safety monitoring

Source: Radius Health, Inc. & Cowen and Company

Phase II Trial Provides Strong Proof Of Concept

Subsequently, Radius conducted a Phase II dose-finding study (Study-002) in postmenopausal women with osteoporosis (T-score ≤ -2.5 at the lumbar or hip, or T-score ≤ -2.0 but having a prior low trauma fracture or an additional risk factor) to evaluate the safety and efficacy of daily injection of abaloparatide when compared to both placebo and Forteo. It was a randomized, placebo-controlled, parallel group dose-finding study at multiple centers in four countries (the United States, Argentina, India, and the United Kingdom). Enrolled patients underwent a four-week pre-treatment period of calcium and vitamin D supplementation that continued throughout the study. Patients were then randomized to daily self-administration of placebo, 20mcg, 40mcg, 80mcg of abaloparatide using a pre-filled cartridge in a pen injector device, or subcutaneous injection of 20mcg of Forteo.

The two primary endpoints of the study were mean percent change from baseline in spine BMD as measured with DXA scans and change in bone metabolism marker PINP, both at Week 24. Secondary endpoints included changes in femoral neck BMD and total hip BMD at Week 24, and change in total spine BMD at Week 48.

Total Spine BMD

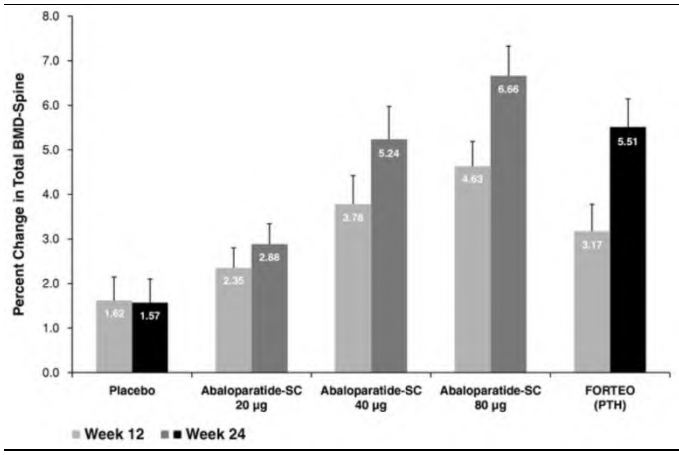
At Week 12, the mean BMD gains in abaloparatide 40mcg and 80mcg groups were statistically significant ($p=0.0013$ and $p<0.001$, respectively). In contrast, BMD increases in the Forteo and placebo groups at this time point were not significant ($p=0.055$). By week 24, injection of abaloparatide continued to demonstrate efficacy in increasing spine BMD. Again, BMD changes for the 40mcg and 80mcg doses of abaloparatide were statistically significant ($p<0.001$ for both doses). Forteo, but not 20mcg of abaloparatide, gained statistical significance ($p<0.001$) after prolonged treatment. Importantly, the increase in lumbar spine BMD in response to abaloparatide

treatment demonstrated clear dose dependency and abaloparatide at 80mcg demonstrated a larger increase in lumbar spine BMD as compared to Forteo at both Week 12 and Week 24.

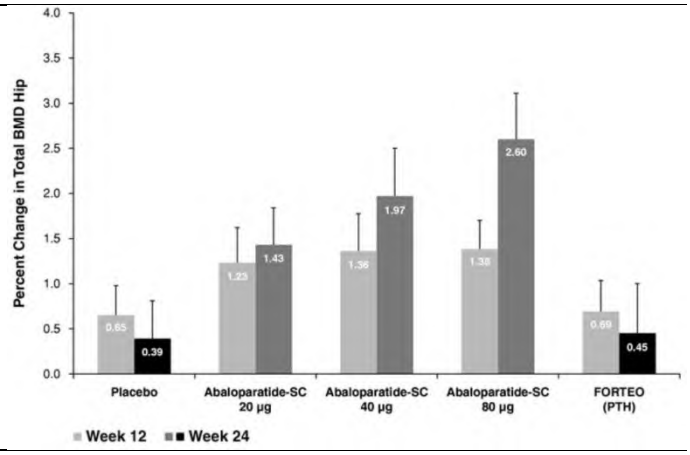
Total Hip BMD

Abaloparatide injection induced an even greater relative response in the hip region. At week 24, the mean percent changes in total analyzable hip BMD were 0.4%, 1.4%, 2.0% and 2.6% in the placebo, abaloparatide 20mcg, 40mcg, and 80mcg groups, respectively. While Forteo treatment only induced mean percent changes comparable to placebo (0.45% VS. 0.39%), injection of 80mcg of abaloparatide demonstrated a five-fold benefit over Forteo.

Mean Percent Change From Baseline In Total Spine BMD



Mean Percent Change From Baseline In Total Hip BMD



Source: Radius Health, Inc.

Abaloparatide Demonstrates Robust Anabolic Effect

Phase 2 Results	Study-002[1]		
Mean % Change	Placebo	Abaloparatide 80 µg	FORTEO® 20 µg
Spine BMD	1.57%	6.66%*	5.51%*
Spine BMD (net placebo)		**5.09%****	**3.94%****
Hip BMD	0.39%	2.60%*	0.45%
Hip BMD (net placebo)		**2.21%****	**-0.06%**
Femoral Neck BMD	0.79%	3.07%*	1.07%
Femoral Neck BMD (net placebo)		**2.28%****	**0.28%**

* p<0.05 vs baseline
** p<0.05 vs placebo

Source: Radius Health, Inc.

Another endpoint, the anabolic bone markers that include N-terminal pro-peptide of type I pro-collagen PINP, bone specific alkaline phosphatase BSAP, and osteocalcin, showed a similar statistically significant dose response. Although Forteo induced a

numerically larger response in the activity of the anabolic bone markers, it also activated bone resorption markers (C-telopeptides of type I collagen cross-links, or CTX, and N-telopeptides of type I collagen cross-links, or NTX) to a greater extent as compared to abaloparatide.

Summary Of Phase II Dose Finding Study For Abaloparatide

Phase II Dose Finding Trial for BA058 Injection		
Enrollment	**Protocol**	**Results/Safety**
Postmenopausal women with osteoporosis (T-score ≤ -2.5 at the lumber or hip, or T-score ≤ -2.0 with either a prior low trauma fracture or an additional risk factor) N = 270 into pretreatment N = 222 randomized N = 221 received study treatment (ITT) N = 187 completed treatment N = 155 evaluated as per protocol population N = 55 into a second 6-month treatment N = 48 completed	Double blind, randomized, placebo- and comparator-controlled ● 4-week of calcium and vitamin D ● Randomized to placebo, abaloparatide 20mcg, 40mcg, 80mcg, or teriparatide ● Daily subcutaneous injection for 6 months ● Subsequently extended to 12 months in a subset of eligible patients **Primary endpoints:** ● Change in total spine BMD as measured with DXA ● Change in marker of anabolic bone growth	● Linear dose dependent trend in mean percentage changes in BMD ● Abaloparatide at 80mcg demonstrated statistically significant difference ($p<0.001$) from placebo at 12 and 24 weeks ● No significant difference between teriparatide and placebo at 12 weeks ● Treatment emergent adverse evnets (TEAEs) similar across all treatment groups ● Higher serum calcium levels througout the study and more cases of hypercalcemia in the teriparatide group showed ● Abaloparatide at 80mcg increased spinal BMD 50% greater and hip and femoral neck BMD 100% greater than teriparatide at the end of additional treatment period

Source: Radius Health, Inc. & Cowen and Company

Abaloparatide's Safety Profile Compared Well To Forteo

Reported treatment emergent adverse events (TEAEs) were comparable in number and profile across all treatment groups. Forteo-treated patients had higher serum calcium levels throughout the study and reported more post-dose episodes of hypercalcemia based on measurements performed pre- and post-dose at multiple times through the study. 53% of Forteo-treated patients had a serum calcium level above normal (≥10.2mg/mL) on one or more occasions, as compared to 27% of patients treated with 80mcg of abaloparatide. Additionally, Forteo induced clinically significant elevation of serum calcium level (≥10.5mg/mL) in 40% of the patients as compared to 18% in the abaloparatide 80mcg cohort.

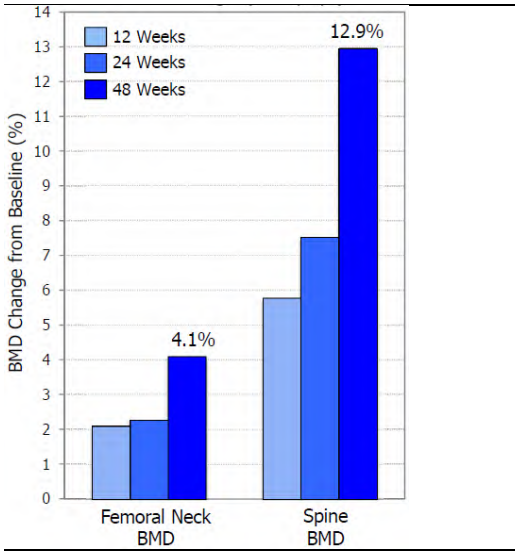
Low titer anti-drug antibodies were detected in 17 of the 187 patients who completed the six-month treatment: one from the placebo group, two from the abaloparatide 20mcg group, eight from the abaloparatide 40 mcg group, and six from the abaloparatide 80mcg group. However, no associated safety events or attenuation of treatment efficacy was observed.

Extension Study Demonstrated Continued Improvement In BMD

An extension study lasting another 24 weeks was offered to patients who completed the first 24 weeks and continued to meet the eligibility criteria (N = 55 patients). BMD continued to increase during the extension study in all the treatment arms, and 80mcg of abaloparatide demonstrated the largest percent increases in total analyzable spine BMD (12.9% compared to 8.6% with Forteo) and femoral neck BMD (4.1% compared

to 2.2% with Forteo). No treatment-related serious adverse events (SAEs) were reported during the extension study, and, overall, incidences of TEAEs were similar in proportion to patients in each group over the total 52-week treatment period. The majority of the TEAEs were mild to moderate, and there were no differences in the profiles of the events.

Continued BMD Increase In Phase II Extension Study



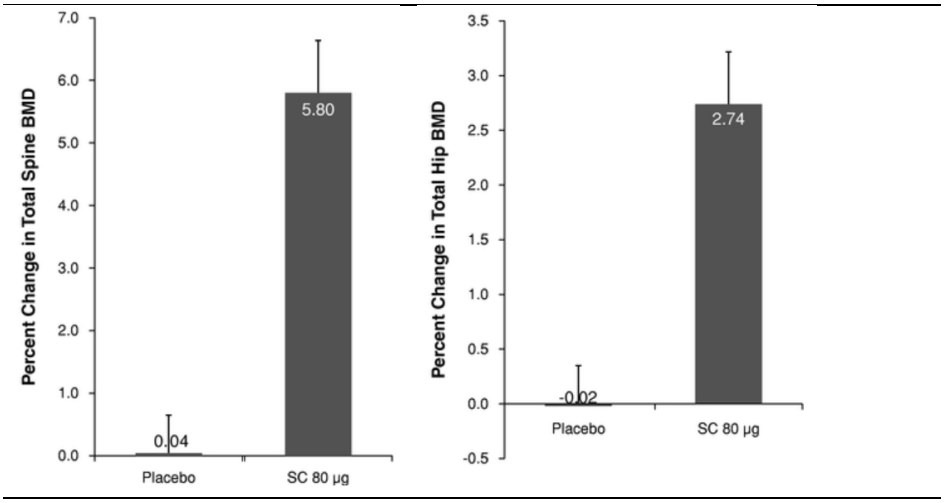
Source: Radius Health, Inc.

In summary, the dose-finding Phase II trial demonstrated that abaloparatide induced a dose-dependent response in BMD at both spine and hip in women with osteoporosis, and that injection of 80mcg abaloparatide achieved better efficacy trends relative to Forteo in terms of BMD, especially in the hip region. In addition, abaloparatide injection induced less hypercalcemia than Forteo.

Second Phase II Clinical Trial Confirms Abaloparatide's Anabolic Activity

In January 2014, Raidus reported positive results from a second Phase II clinical trial (Study-007). The study evaluated the efficacy and safety of transdermal delivery of abaloparatide with a Microneedle Patch. The trial also included subcutaneous injection of abaloparatide as a comparator arm (detailed discussion about the Microneedle patch data can be found in the Microneedle Patch section of this report). The treatment period was six months and the trial included a patch placebo, but no subcutaneous injection of placebo.

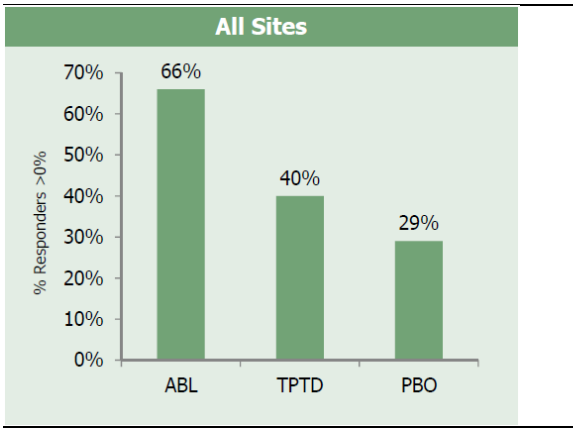
Second Phase II Clinical Trial Confirmed Efficacy Of Abaloparatide



Source: Radius Health, Inc.

Radius further compared the percent of patients achieving a clinically significant BMD increase at all hip and spine sites from each treatment group (abaloparatide, placebo, and Forteo) in Study-002. This analysis revealed a statistically significant higher patient response rate to abaloparatide (66%) than to Forteo (40%) (p=0.025).

Abaloparatide Improves Patient Response



Source: Radius Health, Inc.

Ongoing Phase III Study: The Real Meat On The Bone

Radius is conducting a pivotal Phase III clinical trial to evaluate the efficacy and safety of abaloparatide injection at a dose of 80mcg for the prevention of fractures in postmenopausal women with severe osteoporosis. The study is a double-blind, randomized, multi-center, placebo-controlled trial and is being conducted in 10 countries in the U.S. Europe, Latin America and Asia.

The first patient was enrolled into the study in April 2011, and in March 2013, Radius announced the completion of patient enrollment. The study enrolled a total of 2,463 patients, who are otherwise ambulatory women between the ages of 50 and 85 and

had been postmenopausal for at least five years. Patients were required to have a BMD T score of ≤ -2.5 and > -5.0 at the lumbar spine or femoral neck and to demonstrate:

1) Radiological evidence of either two or more mild or one or more moderate lumbar or thoracic vertebral fractures, or
2) History of low trauma forearm, humerus, sacral, pelvic, hip, femoral, or tibial fracture within the past 5 years

Patients older than 65 will be eligible if they:

1) Meet the above fracture criteria and have a BMD T score of ≤ -2.0 and > -5.0, or
2) Do not meet the fracture criteria but have a BMD T score of ≤ -3.0 and > -5.0

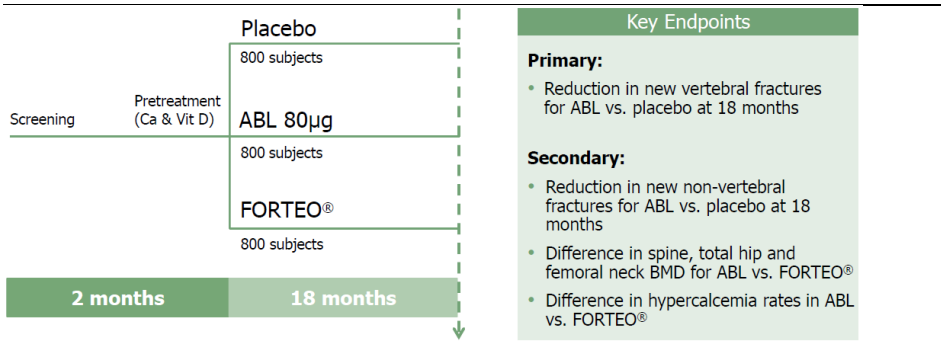
The patients were equally randomized into the following three cohorts:

1) Daily self-administration of abaloparatide injection at 80mcg
2) Matching placebo
3) Forteo injection at 20mcg

The study is double-blinded during the randomization process and remains so between abaloparatide and *placebo* through the end of the study. However, because Forteo is available only in a prefilled drug and device combination that cannot be repackaged, this arm of the trial is *not blinded* to either clinical investigators or patients. Forteo is included as a reference drug and comparator for secondary efficacy and safety analyses. The active treatment period is for 18 months, preceded by a one to three-week screening period as well as a one-week pre-treatment period, and followed by a four-week follow-up period. Similar to the Phase II trial, enrolled patients received calcium and vitamin D supplementation from the time of enrollment until the end of the treatment period, after which the use of these supplements is recommended for the follow-up period as well.

The primary endpoint of the study is the number of abaloparatide-treated patients showing new vertebral fractures at the end of the treatment as compared to placebo. The trial is powered at 90% to demonstrate superiority of abaloparatide in reducing fractures as compared to placebo but is not designed to demonstrate superiority of abaloparatide over Forteo. The powering calculation assumes a 7% fracture event rate in the placebo arm and a 3% event rate in the abaloparatide arm. Secondary endpoints include reduction of incidence in non-vertebral fractures as well as a reduction in moderate and severe vertebral fractures from baseline to end-of-treatment as compared to placebo, changes in BMD of lumbar spine, hip, femoral neck and wrist from baseline to end-of-treatment as compared to Forteo, and number of hypercalcemic events as compared to Forteo. In addition, changes in standing height and in serum bone markers across treatment arms will be measured as secondary endpoints.

Pivotal Phase III Study Design



Source: Radius Health, Inc.

A Six-Month Extension Study Will Satisfy The FDA's Request For 24-Month Data

The 18-month treatment period will be followed by a six-month extension study, during which patients who have received abaloparatide and placebo during the treatment period will all receive alendronate, an oral bisphosphonate. Patients who have received Forteo during the 18-month period will not participate in the six-month extension study. The extension study has an endpoint of assessing the reduction in new vertebral fractures at up to 24 months in all randomized patients to meet the FDA's requirements for osteoporosis studies.

In February 2012, Radius received FDA feedback that a minimum of 24-month fracture data would be required for new therapeutics to receive regulatory approval for the treatment of postmenopausal osteoporosis. Upon discussion with the FDA, Radius is preserving the 18-month primary endpoint, following the original design of the pivotal Phase III clinical trial, but will include the 24-month fracture data after the six-month extension study into the NDA submission. Radius expects to report the top-line data from the 18-month treatment period (the trial's primary endpoint) in Q4:14 and to subsequently submit the NDA in 2015 after completing the six-month extension study.

We Are Optimistic On The Efficacy And Safety Outcome

We believe the solid BMD results from the Phase II study suggest a high likelihood of success in abaloparatide's pivotal Phase III study. A good correlation between BMD increase and fracture reduction has been observed from clinical studies that supported FDA approvals for multiple therapeutics. The Phase III study is not powered to compare abaloparatide and Forteo head-to-head. However, any trend in an improvement in fracture reduction, if detected, will help the commercialization of abaloparatide.

Radius expects to detect a statistical significant difference in the secondary endpoint of hypercalcemic event rates between abaloparatide and Forteo, should the magnitude of difference be consistent with what was observed in the Phase II study. Serum calcium levels will be measured at both four hours and 24 hours post dosing since prolonged calcium levels have a bigger impact on patients.

We expect abaloparatide to receive a similar blackbox warning for osteosarcoma upon FDA approval that will limit the treatment period to 24 months. The long-term rat

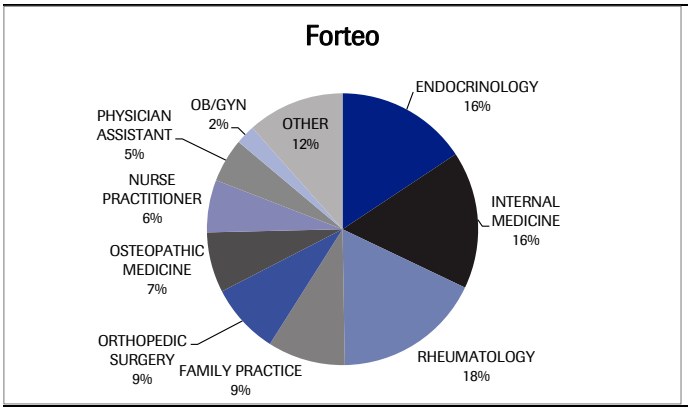
toxicology study that Radius conducted detected comparable incidence of osteosarcoma between abaloparatide and hPTH(1-34) treatment groups.

U.S. Market Addressable Via A Specialty Salesforce

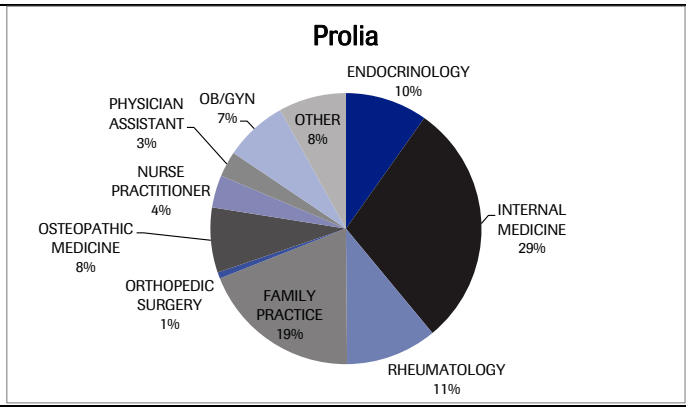
Radius plans to build its own sales force of approximately 150 representatives to target specialists who are high prescribers of injectables for the treatment of severe osteoporosis. Eli Lilly is using a similarly sized sales force (140 reps) to promote Forteo. Radius's market research suggests that 80% of Forteo's prescriptions are written by approximately 9,500 physicians, with 10% of Forteo and Prolia prescriptions being written by as few as 70 and 30 physicians, respectively. Therefore, we believe the Radius sales force will be sufficient to target this rather limited number of physicians.

The following charts are based on numbers from IMS Health and illustrate the specialties of physicians who currently prescribe Forteo and Prolia. Endocrinologists, internal medicine physicians, and rheumatologists are the top three specialties for Forteo and are top prescribers for Prolia as well. The strong "specialty" nature of the prescribing physicians bodes well for Radius's commercialization plan in the U.S. Outside the U.S., Radius plans to enter into collaboration agreements for abaloparatide commercialization.

Specialty Breakdown Of Forteo-Prescribing Physicians



Specialty Breakdown Of Prolia-Prescribing Physicians



Source: IMS Health

Competitive Landscape: Romosozumab And Not Much Else

Amgen is developing romosozumab (formerly known as AMG 785), a monoclonal antibody against sclerostin, in collaboration with UCB for the treatment of postmenopausal osteoporosis. Administered through monthly subcutaneous injections, romosozumab also functions as an anabolic agent by promoting bone formation. Given its demonstrated efficacy in clinical studies and the less frequent injection schedule, romosozumab will likely compete with abaloparatide for share in the growing market for anabolic therapies. However, abaloparatide has an approximately one-year head start versus romosozumab's clinical development program. Results from romosozumab's clinical trials are expected in H1:16.

Phase I dose ranging studies on romosozumab produced highly encouraging results. One administration of romosozumab increased lumbar spine and hip BMD in healthy

volunteers by 3-6% and 1.2-2.6%, respectively, after 84 days. A repeat dose study in healthy volunteers evaluated Q2W and Q4W dosing at multiple doses and demonstrated up to 7.2% increase in spine BMD at six months.

Amgen has completed a large randomized Phase II clinical trial of romosozumab in postmenopausal women with osteoporosis. The study enrolled a total of 419 patients and compared several different doses and frequencies of romosozumab (70mg QM, 140mg QM, 210mg QM, 140mg Q3M, and 210mg Q3M) with placebo and two open label active comparators: Forteo and weekly oral administration of alendronate. The primary endpoint was the percent change from baseline to 12 months in lumbar spine BMD for the individual romosozumab groups as compared to pooled placebo arms.

In April 2011, Amgen and UCB announced positive top-line results from the study. Romosozumab not only demonstrated significant increases in lumbar spine BMD at 12 months as compared to placebo, but compared positively with Forteo and alendronate as well. The highest dose of 210mg QM induced the largest increase of in lumbar spine BMD at 12 months (11.3%). This increase was statistically significant as compared to both Forteo (7% increase) and aladronate (4% increase) ($p<0.001$ for both). Additionally, romosozumab demonstrated statistically significant increase in total hip BMD as well, with a 4.1% improvement vs. 1.1% for Forteo and 1.7% for alendronate ($p<0.001$ for both). Adverse events were generally balanced between groups, although injection site reactions were more frequent in the romosozumab group.

Summary Of Lumbar Spine BMD Data In Romosozumab Phase II Clinical Trial

				Romosozumab				
	Pooled Placebo (N=50)	Alandronate (N=51)	Forteo (N=49)	70mg QM (N=49)	140mg QM (N=48)	210mg QM (N=50)	140mg Q3M (N=52)	210mg Q3M (N=53)
No. of patients with available data	47	47	46	44	46	49	49	51
Mean change in lumbar spine BMD	-0.1%	4.1%	7.1%	5.4%	9.1%	11.3%	5.4%	5.5%
(95% CI)	(-1.2%, 0.9%)	(3.0%, 5.1%)	(6.1%, 8.2%)	(4.3%, 6.4%)	(8.0%, 10.2%)	(10.3%, 12.4%)	(4.4%, 6.5%)	(4.4%, 6.6%)
P values								
vs. pooled placebo	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001
vs. alandronate	-	-	-	NS	<0.001	<0.001	NS	NS
vs. Forteo	-	-	-	0.03	0.03	<0.001	0.03	0.03

Source: Amgen

The ongoing registrational study with romosozumab to treat postmenopausal osteoporosis (FRAME) is a randomized, double-blind, placebo-controlled, parallel-group study to evaluate the safety and efficacy of romosozumab for the treatment of postmenopausal osteoporosis. Approximately 7,180 patients were randomized to receive rozmosozumab or placebo for 12 months, after which all patients will receive Prolia for an additional 24 months. The primary endpoint is incidence of vertebral fractures at 12 months and 24 months. Secondary endpoints include total incidence of fractures at 12 and 24 months as well as changes in BMD from baseline to 12 and 24 months.

A second Phase III clinical trial is comparing romosozumab to the active comparator alendronate. The randomized, double-blind, alendronate-controlled study will randomize approximately 4,000 patients to receive either romosozumab or alendronate for 12 months. All patients will then receive open-label alendronate for at least

another 12 months. The primary endpoint of the study is the incidence of clinical fracture and the incidence of new vertebral fracture from baseline until the date of first clinical fracture assessment at approximately 24 months. Secondary endpoints include incidence of fracture and change in BMD at 12 months, at 24 months, and BMD change at 36 months.

We believe the bone building efficacy of abaloparatide is comparable to that of romosozumab. The following chart compares the BMD increases observed at both drug candidates' highest doses in the Phase II studies. Abaloparatide achieved numerically higher increases in spine BMD and femoral neck BMD at 12 months. However, romosozumab demonstrated an even faster onset of action than abaloparatide with a more prominant spine BMD increase at six months. Additionally, romosozumab demonstrated statistically significant superiority over Forteo in the Phase II study whereas abaloparatide's Phase II study was not powered for Forteo comparison. Moreover, romosozumab demonstrated a larger total hip BMD increase than abaloparatide at 12 months (4.1% vs. 2.7%).

Our consultant noted there is "good buzz" around romosozumab's Phase III program and praised the design of the studies, which in his view is consistent with the right treatment algorithm in the real world – an anabolic boost followed by an anti-resorptive therapy to maintain the benefit from bone formation. We note that abaloparatide's Phase III study has the same design. We believe that the unmet medical need for safe and efficacious anabolic agents is significant and that both abaloparatide and romosozumab have high likelihood of success. Our consultant believes that therapeutics that prove to be superior to Forteo can potentially expand the market for anabolic agents by several fold.

Comparison Of Abaloparatide And Romosozumab Phase II Study Results

	Abaloparatide-SC Phase II		Romosozumab Phase II	
Product	Abaloparatide	Forteo	Romosozumab	Forteo
Dose	80mcg	20mcg	210mcg	20mcg
Dosing frequency	Daily	Daily	Monthly	Daily
No. of injection per dose	1	1	3	1
Type of injection	Self	Self	Physician	Self
Spine mean % BMD change from baseline (24 weeks/6 months)	+6.7%	+5.5%	+8.2%	+4.8%
Spine mean % BMD change from baseline (48 weeks/12 months)	+12.9%	+8.6%	+11.3%	+7.1%
Femoral neck mean % BMD change from baseline (48 weeks/12 months)	+4.1%	+2.2%	+3.7%	+1.1%

Source: Radius Health, Inc. & Amgen

Blosozumab (LY2541546) May Enter Phase III In 2014

Blosozumab is another anti-sclerostin monoclonal antibody being developed by Eli Lilly for the treatment of postmenopausal osteoporosis. Phase I and Phase II clinical trials demonstrated strong efficacy of blosozumab in increasing BMD. A randomized, double-blind, placebo-controlled, parallel group Phase II study evaluated the dose-response to blosozumab. Patients were randomized into four cohorts to receive subcutaneous injection of placebo or blosozumab at different doses and schedules (180mg Q4W, 180mg Q2W, and 270mg Q2W). In a study addendum, additional patients received either placebo or blosozumab at 270mg Q12W. The following table

summarizes the results from the study and blosozumab met the primary endpoint of change from baseline in lumbar spine BMD with statistical significance at all doses tested ($p<0.001$ for all).

Least Square Mean Percent Change In Lumbar Spine BMD From Baseline

		Blosozumab			
	Placebo	270mg Q12W	180mg Q4W	180mg Q2W	270mg Q2W
	(N=37)	(N=26)	(N=31)	(N=30)	(N=30)
12 weeks	-0.92%	5.02%	3.73%	6.18%	7.14%
24 weeks	-0.77%	6.08%	6.32%	10.70%	12.38%
52 weeks	-1.52%	6.72%	8.39%	14.86%	17.75%

Source: Eli Lilly

A Superior Profile Should Help Abaloparatide Fend Off Generic Forteo

Forteo's last patent will expire in December 2018. We expect generic versions of Forteo to post only a modest threat to abaloparatide. Although approved by the FDA through an NDA filing, Forteo is a recombinant protein, whose manufacturing is somewhat complex. The drug's properties can be largely affected by multiple factors such as formulation, delivery method, and purity. In fact, a synthetic version of PTH was found to cause neutralizing antibodies, which inhibited the function of endogenous PTH in treated patients. Therefore, we expect the FDA to set a higher bar for any potential Forteo generic. Given approval barriers and the complexity in manufacturing, generic products may be uncommon and may not have a significant advantage in pricing.

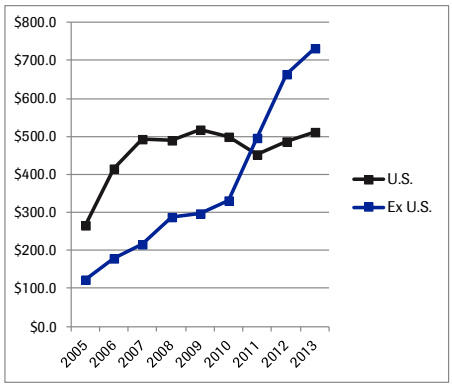
Forteo is distributed through a specialty pharmacy and patients need to install the solution into an auto-injector in order to self-administer the drug. Lilly has produced a training video and has also set up telephone hotline as well as website to assist patients with the correct use of the auto-injector. We believe these extra steps will also deter generic entrants.

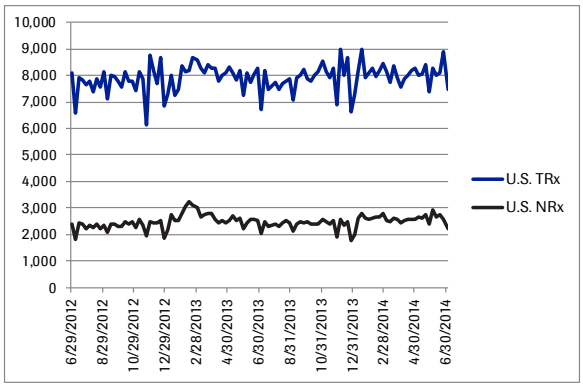
More importantly, our confidence in abaloparatide stems from the drug's differentiated profile as compared to Forteo. We are optimistic that the better BMD data from abaloparatide treatment in the Phase II study will likely be reflected in superior efficacy data in the Phase III study. Solid clinical trial data will be the strongest evidence to convince physicians that abalopratide is the go-to choice for a safe and potent anabolic agent.

Analysis On Abaloparatide Market Opportunity

We base our market model for abaloparatide on Forteo's existing commercial market. Eli Lilly reported total U.S. Forteo sales of $511 million in 2013, and the total prescription and new prescription numbers have remained largely stable for the past three years. Lilly has been taking Forteo price increases at a regular basis, which we believe will contribute to future sales growth. We expect the total market size for second line injectables to continue expanding with new therapeutics, particularly anabolic agents with improved efficacy and safety, entering the market. We believe abaloparatide should achieve peak U.S. sales comparable to the current Forteo sales.

Sales, Scripts And Price Increase History Of Forteo





Effective Date	WAC	% Increase
7/2/2014	$1,545.00	9.0%
12/18/2013	$1,417.40	9.0%
5/15/2013	$1,300.30	9.0%
9/27/2012	$1,192.90	9.0%
12/29/2011	$1,094.40	6.0%
5/10/2011	$1,032.45	9.0%
7/20/2010	$947.20	9.0%
12/15/2009	$868.95	9.0%
1/15/2009	$797.20	8.0%
10/15/2008	$738.15	

Source: IMS Health & PriceRx

We believe a superior efficacy and safety profile for abaloparatide would provide it with a clear advantage in competing with Forteo for market share. Abaloparatide has demonstrated a faster onset of action compared to Forteo, which we believe will enhance physician perception of its treatment effect and identification of patients likely to respond in the real world. This may also be important for securing managed care coverage since many payers require early evidence of clinical benefit for reimbursement approvals. Additionally, unlike Forteo, refrigeration is not required for abaloparatide. Therefore, abaloparatide is easier to use, especially when the patients are traveling.

Revenue Buildup For Abaloparatide-SC

Radius has guided for an NDA submission for abaloparatide in 2015 and we project an FDA approval in H2:16, after which we expect Radius to launch by year end 2016. According to our physician consultants, approximately 20% of osteoporosis patients have failed frontline treatment and might be eligible for injectables. We view these patients as the target population for abaloparatide. IMS Health recorded a total of approximately 0.4 million Forteo prescriptions dispensed through pharmacies in 2013. Therefore, the market penetration by Forteo is still low.

Our revenue model assumes abaloparatide will capture 1% share of the patient-eligible market in 2017. We project the market penetration to rise gradually in the following years, reaching peak penetration of 4% in 2023, and remaining at 4% afterwards until 2025. We conservatively assume that Radius will take an annual increase of 3% in abaloparatide's price.

For ex-U.S. territories, we base our model on the number of patients being treated with Forteo. We model a collaboration agreement from which Radius will retain a 15% back-end royalty from ex-U.S. market revenues.

We project peak U.S. sales of abaloparatide to be $440 million in 2025. The total world-wide abaloparatide revenue in that year, based on our model, is estimated at $790 million. In 2025, Radius might receive total world-wide sales and royalty revenues of 492.5 million.

Abaloparatide Revenue Buildup Model

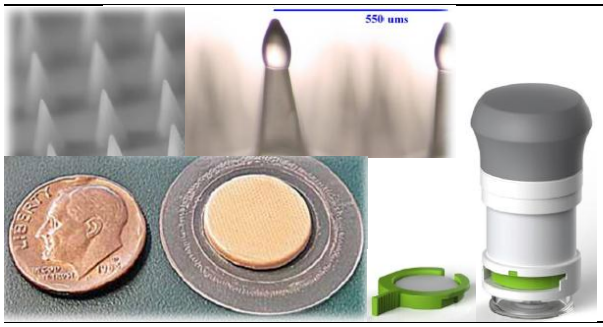
Abaloparatide Revenue Model For Osteoporosis										
	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
U.S.										
Number of patients with osteoporosis (M)	13.1	13.3	13.5	13.7	13.9	14.1	14.3	14.6	14.8	15.0
% growth in number of patients with osteoporosis	*1.5%*	*1.5%*	*1.5%*	*1.5%*	*1.5%*	*1.5%*	*1.5%*	*1.5%*	*1.5%*	*1.5%*
Number of patients diagnosed with osteoporosis (M)	9.6	9.7	9.9	10.0	10.2	10.3	10.5	10.6	10.8	11.0
% of patients diagnosed for osteoporosis	*73.0%*	*73.0%*	*73.0%*	*73.0%*	*73.0%*	*73.0%*	*73.0%*	*73.0%*	*73.0%*	*73.0%*
Number of patients actively being treated for osteoporosis (M)	2.9	2.9	3.0	3.0	3.0	3.1	3.1	3.2	3.2	3.3
% of diagnosed patients being actively treated for osteoporosis	*30.0%*	*30.0%*	*30.0%*	*30.0%*	*30.0%*	*30.0%*	*30.0%*	*30.0%*	*30.0%*	*30.0%*
Number of patients who have failed frontline agents and are eligible for injectables (M)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7
% of patients who fail frontline agents and are eligible for injectables	*20.0%*	*20.0%*	*20.0%*	*20.0%*	*20.0%*	*20.0%*	*20.0%*	*20.0%*	*20.0%*	*20.0%*
Estimated % of patients who recieve Forteo	*6%*	*6%*	*6%*	*5%*	*5%*	*4%*	*4%*	*3%*	*3%*	*2%*
Number of patients who are receive Forteo (000s)	34.5	35.0	32.6	30.0	27.4	24.8	22.0	19.1	16.2	13.1
Estimated % of patients who recieve abaloparatide-SC	*0.2%*	*1%*	*1%*	*2%*	*3%*	*3%*	*3%*	*4%*	*4%*	*4%*
Number of patients receiving abaloparatide-SC (000s)	1.3	4.7	8.1	11.0	15.3	20.7	21.6	22.3	23.0	23.2
Price of abaloparatide-SC per patient per year	$3,750	$15,000	$15,450	$15,914	$16,391	$16,883	$17,389	$17,911	$18,448	$19,002
Total U.S. abaloparatide-SC sales ($MM)	**$5.0**	**$70.0**	**$125.0**	**$175.0**	**$250.0**	**$350.0**	**$375.0**	**$400.0**	**$425.0**	**$440.0**
Y/Y growth		*1300%*	*79%*	*40%*	*43%*	*40%*	*7%*	*7%*	*6%*	*4%*
R.O.W.										
Number of osteoporosis patients on PTH or PTHrP (000s)		60.0	61.0	62.0	63.0	64.0	65.0	66.0	67.0	68.0
% of market penetration by abaloparatide-SC		*1%*	*6%*	*14%*	*19%*	*25%*	*32%*	*34%*	*35%*	*36%*
Number of patients receiving abaloparatide-SC (000s)		0.44	3.45	8.38	12.20	15.80	21.09	22.33	23.49	24.56
Price of abaloparatide-SC per patient per year		$11,250	$11,588	$11,935	$12,293	$12,662	$13,042	$13,433	$13,836	$14,251
Total R.O.W. abaloparatide-SC sales ($MM)		**$5.0**	**$40.0**	**$100.0**	**$150.0**	**$200.0**	**$275.0**	**$300.0**	**$325.0**	**$350.0**
Total royalty to Radius from R.O.W. abaloparatide-SC sales ($MM) (15%)		**$0.8**	**$6.0**	**$15.0**	**$22.5**	**$30.0**	**$41.3**	**$45.0**	**$48.8**	**$52.5**
Total W.W. abaloparatide-SC sales ($MM)	**$5.0**	**$75.0**	**$165.0**	**$275.0**	**$400.0**	**$550.0**	**$650.0**	**$700.0**	**$750.0**	**$790.0**
Total W.W. abaloparatide-SC sales and royalty revenues to Radius ($MM)	**$5.0**	**$70.8**	**$131.0**	**$190.0**	**$272.5**	**$380.0**	**$416.3**	**$445.0**	**$473.8**	**$492.5**

Source: Cowen and Company

Abaloparatide Microneedle Patch: The Future Of Osteoporosis Treatment

Radius is developing abaloparatide Microneedle Patch, a short wear-time, transdermal delivery system in collaboration with 3M Drug Delivery Systems using 3M's patented Solid Micro-structured Transdermal System (sMTS) microneedle technology. As an alternative to subcutaneous injection, the abaloparatide transdermal (abaloparatide-TD) delivery provides a more convenient treatment that could promote compliance and expand the market for abaloparatide. The patch is designed to rapidly release abaloparatide and to produce the desired spike of the drug in the serum.

Abaloparatide Microneedle Patch



Source: Radius Health, Inc.

In a comparative Phase I study, abaloparatide-TD was associated with faster time to C_{max} and shorter half-life than the administration of 80mcg of abaloparatide via injection. The combined single and seven-day repeat-dose Phase Ib trial demonstrated that the abaloparatide Microneedle Patch was safe and well-tolerated in all doses studies, with peak transdermal drug levels comparable to the injection formulation. Bone building activity, evidenced by the increase in serum bone-formation marker P1NP, was observed without increased exposure from longer wear. Additionally, the trial evaluated the optimal dose, wear time and application site.

Phase I safety, PK And Delivery Trial For Microneedle Patch

Phase I Safety, PK and Delivery Trial for Abaloparatide Microneedle Patch		
Enrollment	**Protocol**	**Results/Safety**
N = 74 Heathy postmenopausal women 50-80 years of age	Randomized, double-blind, placebo controlled, ascending single-dose At least one daily dose of abaloparatide Microneedle Patch, placebo Microneedle Patch or subcutaneous injection of 80mcg of BA058	• Rapid release, absorption and elimination • Peak transdermal drug level consistent with injection • Faster to reach C_{max} and shorter half-life than injection • Increase in serum bone-formation marker P1NP after seven days of exposure • Optimal wear time ≤ 5 min; effective sites identified • Similar safety events between TD Patch and injection • No clinical notable difference in laboratory or cardiac safety parameters acorss doses of abaloparatide or routes of administration

Source: Radius Health, Inc. & Cowen and Company

Phase II Clinical Trial Provides Proof-Of-Concept

Following the positive data from the Phase Ib study, Radius initiated a Phase II proof-of-concept study in mid-2012 to evaluate the safety and efficacy of daily use of abaloparatide-TD patch in women with osteoporosis. The randomized, double blind, placebo-controlled, parallel group dose-finding study enrolled a total of 250 healthy postmenopausal women with osteoporosis and compared three doses of abaloparatide-TD patch (50mcg, 100mcg, and 150mcg) with placebo patch as well as subcutaneous injection of abaloparatide at 80mcg. The primary endpoint of the study was the change in lumbar spine BMD at six months. Secondary endpoints included change in hip BMD, change in serum levels of bone formation and resorption markers, safety and tolerability.

In January 2014, Radius announced positive top-line data from the study. At six months, all three doses of abaloparatide-TD patch demonstrated statistical significant and dose-dependent increase in lumbar spine BMD from baseline as compared to placebo patch. Additionally, both the 100mcg and 150mcg doses demonstrated statistically significant increase in total hip BMD from baseline as compared to placebo.

Summary Of Phase II Proof-Of-Concept Study Of Abaloparatide Microneedle Patch

	Microneedle Patch				
		Abaloparatide-TD			
	Placebo	50mcg	100mcg	150mcg	Abaloparatide-SC
Lumber Spine	0.04%	1.87%	2.33%	2.95%	5.80%
Clinical benefit		1.83%	2.29%	2.91%	
p Value		p=0.0066	p=0.0005	p<0.0001	
Total Hip	-0.02%	0.97%	1.32%	1.49%	2.74%
Clinical benefit		0.99%	1.33%	1.51%	
p Value		NS	p=0.0056	p=0.0018	

Source: Radius Health, Inc.

Abaloparatide-TD Patch Is A Real Possibility …

We believe the abaloparatide-TD patch could become a meaningful asset for Radius. The transdermal administration system is extremely user friendly and eliminates the need for needle-based subcutaneous injection. Therefore, in addition to increasing patient compliance, it may appeal to a larger patient population including those who prefer an alternative to needle-based injections. Moreover, in the first completed Phase I clinical trial abaloparatide-TD patch demonstrated a faster time to C_{max} and shorter half-life when compared to the injection formulation which we believe may translate into a more benign side-effect profile. We believe abaloparatide-TD patch could gain rapid market penetration if it can successfully replicate injectable abaloparatide's profile.

… But Radius Has Some More Work To Do

Although the completed Phase II proof-of-concept study demonstrated statistically significant increase in both lumbar spine and total hip BMD from abaloparatide-TD

patch treatment as compared to placebo, the magnitude of improvement was not comparable to the subcutaneous injection formulation.

Radius has three regulatory strategies for developing abaloparatide-TD patch. The first and the shortest regulatory pathway is to demonstrate bioequivalence to the subcutaneous formulation. Radius is optimizing the patch in an attempt to more closely match the profile of the injectable. The company expects to release the optimization results in late 2014. We believe Radius and 3M may be focused on raising plasma concentration, particularly area under the curve (AUC), in patients who receive abaloparatide-TD patch.

The second possible pathway is by demonstrating non-inferiority in BMD improvement as compared to the subcutaneous injection of abaloparatide and to pursue regulatory approval through the 505(b)(2) pathway. This regulatory pathway would allow Radius to obtain FDA approval of abaloparatide-TD by using information from the filing for the subcutaneous formulation without the need for a new clinical trial to demonstrate efficacy in fracture reduction. However, given that the abaloparatide-TD patch BMD data in the Phase II proof-of-concept study were lower as compared to subcutaneous injection, we believe this pathway will also require patch optimization.

Radius could also pursue the standard NDA submission pathway by completing a well-controlled fracture study for abaloparatide-TD. We believe regulatory approvals would be possible as long as Radius is able to demonstrate a statistical significant clinical benefit as compared to placebo. This could be the most straightforward pathway, in our opinion, although it will take more time and investment than the other two options.

Due to elected uncertainties in its clinical development plan and associated timelines, we have not included the abaloparatide-TD program into our model or valuation and treat it as an upside potential for Radius.

Intellectual Property: The Flesh And Bones Of Abaloparatide

In 2005, Radius acquired the exclusive worldwide rights, excluding Japan, to develop, manufacture and distribute abaloparatide and its analogs from Ipsen. Abaloparatide's composition of matter is claimed in U.S. patent 5,969,095. It has also been issued in Europe and other major foreign countries. The U.S. patent remains effective until 2016 but extension is possible based on the data exclusivity provisions applied to new molecule entities (Hatch-Waxman patent term extension). A method for treating osteoporosis with a subcutaneous injection of abaloparatide at the dosage used in the Phase III clinical program is covered by U.S. patent 7,803,770 that expires in 2028, not including Hatch-Waxman extension. Additionally, a U.S. patent 8,148,333 covers the intended therapeutic formulation for aboloparatide-SC and will provide exclusivity until 2027, again absent Hatch-Waxman extension.

For the abaloparatide-TD program, a provisional patent application has been filed in 2011 in the United States (U.S. app. #61/478,466) to cover various aspects of the formulation. Any issued patent from that application will expire no earlier than 2032.

The license agreement between Radius and Ipsen requires Radius to make milestone payments, ranging from $13.8 million to $50.0 million, upon the achievement of certain future clinical and regulatory milestones. Ipsen is further entitled to a fixed 5% royalty based on net sales of abaloparatide on a country by country basis until the later of the

last to expire of the licensed patents or for a period of 10 years after the first commercial sale in a certain country.

RAD1901: Seeking And Destroying ER+ Brain Mets

Radius's other clinical candidate, RAD1901, is an oral selective estrogen receptor modulator (SERM) that the company licensed from Eisai. Radius has completed a Phase II proof-of-concept trial that evaluated RAD1901 for the treatment of vasomotor symptoms (hot flashes) in peri-menopausal women. RAD1901 demonstrated a strong safety and tolerability profile in the study. However, based on RAD1901's activity as a selective estrogen receptor down-regulator (SERD) at higher doses and its ability to cross the blood brain barrier, Radius has made the strategic decision to develop this compound for the treatment of breast cancer patients with brain metastases (BCBM). Radius is conducting a Phase I PK/PD trial in healthy volunteers to identify the maximum tolerated dose and will also initiate a Phase Ib study in breast cancer patients in late 2014.

ER Positive Metastatic Breast Cancer And Treatment Paradigm

The American Cancer Society estimates that approximately 233,000 women will develop breast cancer in the U.S. in 2014. Breast cancer can be divided into different types based on the status of three receptors on cancer cells: hormone receptors for estrogen (ER) and progesterone (PR), as well as human epidermal growth factor receptor 2 (HER2). Approximately 60% to 70% of the patients have ER positive breast cancer, meaning their tumor cells are receiving signals from estrogen that promote tumor growth. ER positive patients receive hormonal therapy first-line.

Hormonal therapy, sometimes also referred to as anti-estrogen therapy or endocrine therapy, seeks to either lower patients' estrogen levels or to block the binding between estrogen and estrogen receptors on tumor cells. Hormonal therapy is effective for most ER-positive or PR-positive tumors. Hormonal therapies include:

1) **SERMs**. SERMs bind to the estrogen receptor to block the effects of estrogen on breast tissue. Tamoxifen, a daily oral medication, is the most commonly used SERM for the treatment of ER-positive breast cancer including metastatic breast cancer and is effective in both premenopausal and postmenopausal patients. Another SERM Fareston (toremifene) is used to treat advanced breast cancer in postmenopausal women.

2) **Aromatase inhibitors (AIs).** In contrast to SERMs, which block estrogen's ability to "turn on" cancer cells, the aromatase inhibitors limit the amount of estrogen produced. In post-menopausal women, although estrogen is no longer produced by the ovaries, it is converted from androgen, and these inhibitors block the conversion. In the past, these medications were most commonly used by women who may have already tried other anti-estrogen therapies, such as tamoxifen, and whose cancer was no longer controlled by those drugs. Clinical studies which support the earlier use of these drugs have shifted this timeline and aromatase inhibitors are gaining use as adjuvant therapy. Arimidex (anastrozole, AstraZeneca), Femara (letrozole, Novartis), and Aromasin (exemestane, Pfizer) are oral aromatase inhibitors used in women with metastatic breast cancer and to reduce the risk of cancer recurrence in early stage patients.

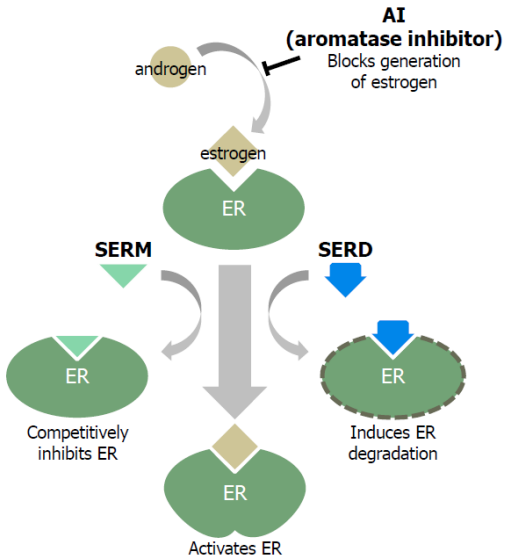
3) **Ovarian suppression.** Ovarian suppression stops the ovaries from producing estrogen in pre-menopausal patients. It is one of the oldest hormonal therapies

for the treatment of ER-positive breast cancer. Zoladex (goserelin, AstraZeneca) and Lupron (leuprolide, Abbott) are gonadotropin and luteinizing releasing hormone analogues, respectively. Through subcutaneous injections, they can stop the ovaries from producing estrogen within one to three months, thereby causing temporary menopause. They are most commonly administered with tamoxifen or AIs but can be used as monotherapy for ER-positive breast cancer. Ovarian ablation (surgical removal of the ovaries) may be considered for certain patients as well.

4) **SERDs.** Faslodex (fulvestrant, AstraZeneca) is a SERD approved for the treatment of metastatic breast cancer. Administered via monthly intramuscular injections, it down-regulates ER protein levels in addition to competitively binding to the ER as an antagonist. Faslodex is indicated for the treatment of HR-positive metastatic breast cancer in postmenopausal women with disease progression following antiestrogen therapy.

SERDs are a promising class of therapeutics for ER-positive metastatic breast cancer since they address the issue of resistance to SERMs and AIs. Many patients become insensitive to these therapies due to mutations in ER. Resistance to hormonal therapy is a significant challenge in the treatment of ER-positive metastatic breast cancer since approximately 50% of patients who die from breast cancer are positive for ER but no longer respond to SERMs and AIs.

Therapeutic Options For ER-Positive Cancers



Source: Cowen and Company

BCBM Is A Significant Unmet Medical Need

In the U.S., the vast majority of breast cancer cases (90-95%) present at an early-stage (Stages I, II, or III). Patients diagnosed with early-stage breast cancer are typically treated with surgery to remove the tumor(s). However, approximately 20% of treated patients experience recurrence. Relapsed patients and patients diagnosed at a later stage (stage IV) have metastatic disease.

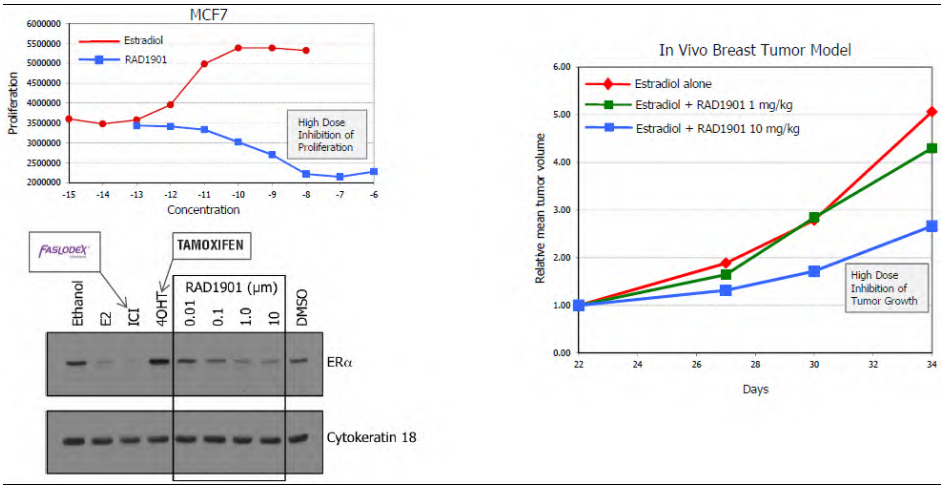
The annual incidence of BCBM is approximately 10,000 in both the U.S. and Europe. The number of patient developing brain metastases from breast cancer has been on the rise since a number of treatments, such as Herceptin, are effective at prolonging survival and controlling disease outside the brain. Patients with brain metastases have very poor prognosis with few treatment options. Brain metastases in patients with controlled systemic disease are typically treated with surgical resection and/or whole brain radiation therapy. However, neither is optimal and as a result, the mortality rate from CNS progression remains high. Our physician consultants view breast cancer with brain metastases as a significant unmet medical need.

In March 2014, Radius submitted an application for Orphan Drug designation for RAD1901 for the treatment of BCBM. If granted, the designation will entitle RAD1901 to seven years of exclusivity in the U.S.

RAD1901 Demonstrated Promising Tumor Suppressing Activity In Preclinical Studies

Results from *in vitro* and preclinical studies demonstrated that at a high dose RAD1901 1) inhibits the proliferation of MCF7, a human breast cancer cell line, on culture dishes, 2) counteracts the stimulating effect of estrogen on tumor growth in an animal breast cancer model, and 3) induces the degradation of ER. Importantly, a high concentration (6x the serum levels) was detected in the CNS after oral administration in animals. The strong efficacy data from the completed Phase II proof-of-concept study for vasomotor symptoms also support RAD1901's ability to cross the blood brain barrier effectively.

RAD1901 Inhibits Tumor Growth And Induces ER Degradation



Source: Cowen and Company

The Phase I safety, PK and bioavailability studies that Radius conducted for the indication of vasomotor symptoms demonstrated that RAD1901 was well-tolerated with bioavailability at approximately 10%. Treatment emergent adverse events were of mild intensity and no serious adverse events were observed.

The ongoing Phase I study in healthy volunteers seeks to identify the maximum tolerated dose and Radius expects to report the results in September 2014. Additionally, Radius plans to evaluate the CNS penetration by RAD1901 and to assess the compound's efficacy in binding to and degrading ER using radiolabeled estradiol

and position emission tomography (PET) scanning. Such imaging data could provide important proof-of-concept for RAD1901 activity.

RAD1901 Has Strong Market Potential

We have not included RAD1901 for BCBM into our revenue model or company valuation due to the early stage of this program. However, we believe the product can potentially achieve rapid uptake upon successful clinical development given the lack of both available treatment options and other therapeutic candidates in the pipeline. An illustrative market model is provided below.

Projections On RAD1901 Market Potential

U.S.	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Incidence of breast cancer	250,000	252,000	254,016	256,048	258,097	260,161	262,243	264,341
% diagnosed with early stage disease (Stage I-III)	93%	93%	93%	93%	93%	93%	93%	93%
# diagnosed with early stage disease (Stage I-III)	232,500	234,360	236,235	238,125	240,030	241,950	243,886	245,837
% of Stage I-III patients that have recurrence (metastatic)	20%	20%	20%	20%	20%	20%	20%	20%
# recurring early stage disease (Stage I-III) patients	46,500	46,872	47,247	47,625	48,006	48,390	48,777	49,167
% diagnosed with advanced stage disease	7%	7%	7%	7%	7%	7%	7%	7%
# diagnosed with advanced stage disease	17,500	17,640	17,781	17,923	18,067	18,211	18,357	18,504
Total number of new patients with metastatic breast cancer	64,000	64,512	65,028	65,548	66,073	66,601	67,134	67,671
% incidence of breast cancer metasteses to the brain	15%	15%	15%	15%	15%	15%	15%	15%
Number of newly incident BCBM patients(MM)	9,600	9,677	9,754	9,832	9,911	9,990	10,070	10,151
% of estrogen receptor positive breast cancer	75%	75%	75%	75%	75%	75%	75%	75%
Number of estrogen positive BCBM patients (MM)	7,200	7,258	7,316	7,374	7,433	7,493	7,553	7,613
% of patients receving RAD1901 treatment	3%	10%	20%	27%	32%	35%	36%	36%
Number of patients receiving RAD1901	214	693	1,481	1,961	2,348	2,588	2,692	2,730
Price per patient per year	$70,000	$72,100	$74,263	$76,491	$78,786	$81,149	$83,584	$86,091
U.S. total RAD1901 revenue ($MM)	**15.0**	**50.0**	**110.0**	**150.0**	**185.0**	**210.0**	**225.0**	**235.0**

Source: Cowen and Company

Roche's Acquisition Of Seragon Supports RAD1901's Value

The potential value of the RAD1901 program gains support from the recent Roche acquisition of Saregon Pharmaceuticals, a private company developing SERDs for the treatment of metastatic breast cancers as well as other hormone driven cancers such as endometrial and ovarian cancer. Seragon was spun out from Aragon Pharmaceuticals in August 2013 and acquired by Roche in July 2014 $725 million in cash and additional contingent payments of up to $1 billion based on achievement of certain predetermined milestones.

Seragon's lead candidate ARN-810 is a SERD in an ongoing Phase I clinical trial for the treatment of ER-positive metastatic breast cancer. The study was initiated in April 2013 and results are expected in Q4:14. Seragon shared preliminary data from the dose-escalating, open-label study in postmenopausal women with locally advanced or metastatic ER-positive breast cancer at a symposium in February 2014. Imaging data from patients treated for four weeks demonstrated that the binding of labeled estrogen with the receptor at metastatic lesions was replaced by ARN-810. Additional immunohistochemical data demonstrated reduction in ER level after two cycles of treatment.

ARN-810's early clinical data are promising but there is no evidence to suggest that the compound can cross the blood brain barrier.

RAD1901 Protected By Patents Through 2026

In 2006, Radius licensed the exclusive worldwide rights (except for Japan) to RAD1901 from Eisai Co. Ltd. The composition of RAD1901 is covered by issued U.S. patents 7,612,114, 7,960,412, and 8,399,520, which provide exclusivity until 2026. Additional patent applications have been filed to cover the method for treating vasomotor symptoms with RAD1901, clinical dosages and combination treatment modalities. Radius is required to make payments to Eisai upon the achievement of certain future clinical and regulatory milestones. Additionally, Radius will need to make royalty payments in a variable mid-single digit range based on net sales of RAD1901 on a country by country basis, for a period that expires on the later of either the date of last patent expiration or a period of 10 years after the first commercial sale of RAD1901 in a certain country.

Valuation Methodology And Risks

Valuation Methodology

Biotechnology:

In calculating our 12-month target price, we employ one or more valuation methodologies, which include a discounted earnings analysis, discounted cash flow analysis, net present value analysis and/or a comparable company analysis. These analyses may or may not require the use of objective measures such as price-to-earnings or price-to-sales multiples as well as subjective measures such as discount rates.

We make investment recommendations on early stage (pre-commercial) biotechnology companies based upon an assessment of their technology, the probability of pipeline success, and the potential market opportunity in the event of success. However, because these companies lack traditional financial metrics, we do not believe there are any good methodologies for assigning a specific target price to such stocks.

Investment Risks

Biotechnology:

There are multiple risks that are inherent with an investment in the biotechnology sector. Beyond systemic risk, there is also clinical, regulatory, and commercial risk. Additionally, biotechnology companies require significant amounts of capital in order to develop their clinical programs. The capital-raising environment is always changing and there is risk that necessary capital to complete development may not be readily available.

Risks To The Price Target

Radius Health is unprofitable, has no approved products, and will likely need to raise additional capital from the public markets prior to turning profitable. There is no guarantee that abaloparatide's Phase III study will meet its primary endpoint of fracture reduction. Even if successful, abaloparatide may face other commercial and competitive risks that thwart adoption.

We make investment recommendations on early stage (pre-commercial) biotechnology companies based upon an assessment of their technology, the probability of pipeline success, and the potential market opportunity in the event of success. However, because these companies lack traditional financial metrics, we do not believe it there are any good methodologies for assigning a specific target price to such stocks.

Addendum

Stocks Mentioned In Important Disclosures

Ticker	Company Name
KITE	Kite Pharma
RDUS	Radius Health
RLYP	Relypsa
SNSS	Sunesis Pharmaceuticals

Analyst Certification

Each author of this research report hereby certifies that (i) the views expressed in the research report accurately reflect his or her personal views about any and all of the subject securities or issuers, and (ii) no part of his or her compensation was, is, or will be related, directly or indirectly, to the specific recommendations or views expressed in this report.

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Cowen and Company Rating System effective May 25, 2013

Outperform (1): The stock is expected to achieve a total positive return of at least 15% over the next 12 months

Market Perform (2): The stock is expected to have a total return that falls between the parameters of an Outperform and Underperform over the next 12 months

Underperform (3): Stock is expected to achieve a total negative return of at least 10% over the next 12 months

Assumption: The expected total return calculation includes anticipated dividend yield

Cowen and Company Rating System until May 25, 2013

Outperform (1): Stock expected to outperform the S&P 500

Neutral (2): Stock expected to perform in line with the S&P 500

Underperform (3): Stock expected to underperform the S&P 500

Assumptions: Time horizon is 12 months; S&P 500 is flat over forecast period

Cowen Securities, formerly known as Dahlman Rose & Company, Rating System until May 25, 2013

Buy – The fundamentals/valuations of the subject company are improving and the investment return is expected to be 5 to 15 percentage points higher than the general market return

Sell – The fundamentals/valuations of the subject company are deteriorating and the investment return is expected to be 5 to 15 percentage points lower than the general market return

Hold – The fundamentals/valuations of the subject company are neither improving nor deteriorating and the investment return is expected to be in line with the general market return

Cowen And Company Rating Definitions

Distribution of Ratings/Investment Banking Services (IB) as of 06/30/14

Rating	Count	Ratings Distribution	Count	IB Services/Past 12 Months
Buy (a)	417	58.57%	94	22.54%
Hold (b)	279	39.19%	7	2.51%
Sell (c)	16	2.25%	0	0.00%

(a) Corresponds to "Outperform" rated stocks as defined in Cowen and Company, LLC's rating definitions. (b) Corresponds to "Market Perform" as defined in Cowen and Company, LLC's ratings definitions. (c) Corresponds to "Underperform" as defined in Cowen and Company, LLC's ratings definitions.

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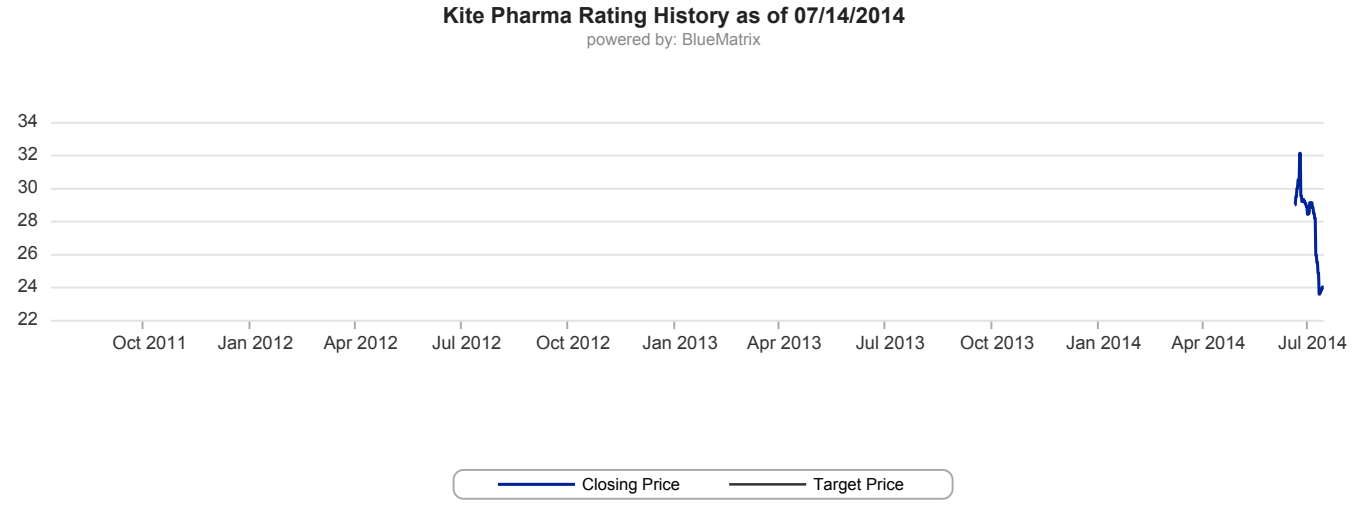

Radius Health Rating History as of 07/14/2014
powered by: BlueMatrix

Relypsa Rating History as of 07/14/2014
powered by: BlueMatrix

Sunesis Pharmaceuticals Rating History as of 07/14/2014
powered by: BlueMatrix

Rating Change - 2/21/2006 - Outperform Rating

Legend for Price Chart:

I = Initiation | 1 = Outperform | 2 = Market Perform | 3 = Underperform | UR = Price Target Under Review | T = Terminated Coverage | $xx = Price Target | NA = Not Available | S=Suspended

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