Radius Health, Inc.
Form 424B5
January 20, 2015

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Registration No. 333-201610

The information in this preliminary prospectus supplement and the accompanying prospectus, relating to an effective registration statement under the Securities Act of 1933, as amended, is not complete and may be changed. This preliminary prospectus supplement and the accompanying prospectus are not an offer to sell nor do they seek an offer to buy these securities in any jurisdiction where the offer or sale is not permitted.

Subject to Completion, Dated January 20, 2015

PRELIMINARY PROSPECTUS SUPPLEMENT
(To the Prospectus dated January 20, 2015)

3,500,000 Shares

Radius Health, Inc.

Common Stock

We are offering 3,500,000 shares of our common stock. Our common stock is listed on The NASDAQ Global Market under the symbol "RDUS." On January 16, 2015, the last reported sale price of our common stock was $39.39 per share.

See "Risk Factors" beginning on page S-5 to read about factors you should consider before buying shares of our common stock.

Neither the Securities and Exchange Commission nor any other regulatory body has approved or disapproved of these securities or passed upon the accuracy or adequacy of this prospectus supplement or accompanying prospectus. Any representation to the contrary is a criminal offense.

	Per Share	Total
Public offering price	$	$

Underwriting discount(1)	$	$
Proceeds, before expenses, to Radius Health, Inc.	$	$

(1) See "Underwriting" beginning on page S-13 for additional information regarding underwriting compensation.

We have granted the underwriters a 30-day option to purchase up to an additional 525,000 shares from Radius Health, Inc. at the public offering price less the underwriting discount.

The underwriters expect to deliver the shares against payment on , 2015.

Goldman, Sachs & Co. **BofA Merrill Lynch**

Cowen and Company

Prospectus Supplement dated , 2015.

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Prospectus Supplement

Accompanying Prospectus

You should rely only on the information contained or incorporated by reference in this prospectus supplement, the accompanying prospectus and in any free writing prospectuses we have prepared in connection with this offering. Neither we nor any of the underwriters have authorized any other person to provide you with any information that is different. If anyone provides you with different or inconsistent information, you should not rely on it. We are offering to sell, and seeking offers to buy, shares of our common stock only in jurisdictions where offers and sales are permitted. The distribution of this prospectus supplement and the offering of shares of our common stock in certain jurisdictions may be restricted by law. Persons outside the United States who come into possession of this prospectus supplement must inform themselves about, and observe any restrictions relating to, the offering of shares of our common stock and the distribution of this prospectus supplement outside the United States. This prospectus supplement does not constitute, and may not be used in connection with, an offer to sell, or a solicitation of an offer to buy, any securities offered by this prospectus supplement by any person in any jurisdiction in which it is unlawful for such person to make such an offer or solicitation.

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ABOUT THIS PROSPECTUS SUPPLEMENT

This document is part of a registration statement that we filed with the Securities and Exchange Commission, or the SEC, as a "well-known seasoned issuer" as defined in Rule 405 under the Securities Act of 1933, as amended, using a "shelf" registration process and consists of two parts. The first part is this prospectus supplement, including the documents incorporated by reference, which describes the specific terms of this offering. The second part is the accompanying prospectus, including the documents incorporated therein by reference, which provides more general information. Generally, when we refer only to the "prospectus," we are referring to both parts of this document combined. Before you invest, you should carefully read this prospectus supplement, the accompanying prospectus, all information incorporated by reference herein and therein, as well as the additional information described under "Where You Can Find More Information; Incorporation by Reference" on page S-20 of this prospectus supplement. These documents contain information you should consider when making your investment decision. This prospectus supplement may add, update or change information contained in the accompanying prospectus. To the extent that any statement we make in this prospectus supplement is inconsistent with statements made in the accompanying prospectus or any documents incorporated by reference, the statements made in this prospectus supplement will be deemed to modify or supersede those made in the accompanying prospectus and such documents incorporated by reference.

Unless otherwise indicated, information contained in this prospectus supplement, the accompanying prospectus or the documents incorporated by reference, concerning our industry and the markets in which we operate, including our general expectations and market position, market opportunity and market share, is based on information from our own management estimates and research, as well as from industry and general publications, and research, surveys and studies conducted by third parties. Management estimates are derived from publicly available information, our knowledge of our industry and assumptions based on such information and knowledge, which we believe to be reasonable. In addition, assumptions and estimates of our and our industry's future performance are necessarily subject to a high degree of uncertainty and risk due to a variety of factors, including those described in "Risk Factors" in this prospectus supplement, the accompanying prospectus and in our Amendment No. 1 to Annual Report on Form 10-K/A for the fiscal year ended December 31, 2013 and our Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2014, which are incorporated by reference into this prospectus supplement. These and other important factors could cause our future performance to differ materially from our assumptions and estimates. See "Special Note Regarding Forward-Looking Statements."

RADIUS HEALTH and our logo are two of our trademarks that are used in this prospectus supplement, the accompanying prospectus and the documents incorporated by reference. This prospectus supplement, the accompanying prospectus and the documents incorporated by reference also include trademarks, tradenames and service marks that are the property of other organizations. Solely for convenience, trademarks and tradenames referred to in this prospectus supplement, the accompanying prospectus and the documents incorporated by reference appear without the ® and symbols, but those references are not intended to indicate, in any way, that we will not assert, to the fullest extent under applicable law, our rights or that the applicable owner will not assert its rights, to these trademarks and tradenames.

Unless stated otherwise or the context otherwise indicates, all references in this prospectus supplement or the accompanying prospectus to "Radius," "the Company," "we," "us" or "our" refer to Radius Health, Inc.

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PROSPECTUS SUPPLEMENT SUMMARY

This summary highlights selected information about us, this offering and information appearing elsewhere in this prospectus supplement, in the accompanying prospectus and in the documents incorporated by reference into this prospectus supplement and the accompanying prospectus. This summary is not complete and does not contain all of the information you should consider before investing in our common stock pursuant to this prospectus supplement and the accompanying prospectus. Before making an investment decision, to fully understand this offering and its consequences to you, you should carefully read this entire prospectus supplement and the accompanying prospectus, including "Risk Factors" beginning on page S-5 of this prospectus supplement, the financial statements and related notes, and the other information that we incorporate by reference into this prospectus supplement, including the section "Risk Factors" in our Amendment No. 1 to Annual Report on Form 10-K/A for the fiscal year ended December 31, 2013 and our Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2014.

Radius Health, Inc.

Our Company

We are a science-driven biopharmaceutical company focused on developing new therapeutics for patients with osteoporosis as well as other serious endocrine-mediated diseases. Our lead development candidate is the investigational drug abaloparatide (BA058), a bone anabolic for the potential treatment of osteoporosis delivered via subcutaneous injection, which we refer to as abaloparatide-SC. We announced the 18-month top-line data from our Phase 3 clinical trial evaluating abaloparatide-SC for potential use in the reduction of fractures in postmenopausal osteoporosis in December 2014. Patients from the abaloparatide and placebo groups from our Phase 3 clinical trial are eligible to continue in a six-month extension study, in which they are receiving an approved alendronate therapy for osteoporosis management. We currently anticipate the first results from the ongoing six-month extension study to be available in the second quarter of 2015. Following completion of the extension study, we plan to submit a new drug application, or NDA, in the United States, and a marketing authorization application, or MAA, in Europe, during the second half of 2015. We hold worldwide commercialization rights to abaloparatide-SC, other than in Japan, and subject to a regulatory review and favorable regulatory outcome, we anticipate our first commercial sales of abaloparatide-SC will take place in 2016. We are leveraging our investment in abaloparatide-SC to develop a line extension that is designed to improve patient convenience by enabling administration of abaloparatide through an investigational short-wear-time transdermal patch, which we refer to as abaloparatide-TD.

Our current clinical product portfolio also includes the investigational drug RAD1901, a selective estrogen receptor down-regulator/degrader, or SERD, and the investigational drug RAD140, a nonsteroidal selective androgen receptor modulator, or SARM. We are developing RAD1901 at higher doses for the potential treatment of metastatic breast cancer, and intend to advance its development with the initiation of Phase 1 clinical trials, including a maximum tolerated dose study that has commenced patient dosing and a Phase 1 clinical trial in metastatic breast cancer patients that, as of the date of this prospectus supplement, is open for patient screening and enrollment. At lower doses, RAD1901 acts as a selective estrogen-receptor modulator, or SERM. Low-dose RAD1901 has shown potential to be effective for the treatment of vasomotor symptoms such as hot flashes in a successful Phase 2 proof of concept study. We intend to commence a Phase 2b clinical trial in vasomotor symptoms in the second half of 2015.

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Recent Developments

In December 2014, we announced positive 18-month top-line data from our Phase 3 clinical trial of the investigational drug abaloparatide-SC for potential use in the reduction of fractures in postmenopausal osteoporosis that showed that on the primary endpoint, abaloparatide-SC (n=690, fracture rate 0.72%) achieved a statistically significant 83% reduction of incident vertebral fractures as compared to the placebo-treated group (n=711, fracture rate 4.36%) ($p<0.0001$). The open-label teriparatide injection treatment group (n=717, fracture rate 0.98%) showed a statistically significant 78% reduction of incident vertebral fractures as compared to the placebo-treated group ($p<0.0001$). On the secondary endpoints, as compared to placebo, abaloparatide-SC achieved a statistically significant fracture-rate reduction of 43% in the adjudicated non-vertebral fracture subset of patients; a statistically significant reduction of 45% in the adjudicated clinical fracture group, which includes both vertebral and non-vertebral fractures; and a statistically significant difference in the time to first incident non-vertebral fracture in both the adjudicated non-vertebral fracture ($p=0.0489$) and the clinical fracture subset of patients ($p=0.0112$). The open-label teriparatide injection treatment group, as compared to placebo, achieved a fracture-rate reduction of 28% in the adjudicated non-vertebral fracture subset of patients and a reduction of 29% in the adjudicated clinical fracture group. The fracture-rate reduction observed in the abaloparatide-SC treatment group, as compared to open-label teriparatide, was not statistically significant.

In January 2015, the U.S. Food and Drug Administration, or FDA, provided us with comments on the draft Statistical Analysis Plan, or SAP, that was used for the analysis of the top-line data from the Phase 3 clinical trial. In its correspondence, FDA made several recommendations for changes in the data analyses undertaken in the SAP. We have performed these analyses and believe that, as noted below, there are no material changes from the top-line results that we announced in December 2014. Patients from the abaloparatide and placebo groups from our Phase 3 clinical trial are eligible to continue in a six-month extension study, in which they are receiving an approved alendronate therapy for osteoporosis management. We currently anticipate the first results from the ongoing six-month extension study to be available in the second quarter of 2015. We believe that the abaloparatide-SC program is on-track for submission of an NDA for abaloparatide-SC to the FDA, and submission of an MAA to the European Medicines Agency, or EMA, in the second half of 2015. However, FDA and EMA have not reviewed any of the data from the ACTIVE trial. The results from the ACTIVE trial and from the first six months of the ACTIVExtend trial, together with the entire data set from the abaloparatide development program, are subject to regulatory review, and only FDA and EMA can separately determine whether the data in the new drug application, once submitted, support approval of the investigational drug abaloparatide-SC for its potential use in the reduction of fractures in postmenopausal osteoporosis.

In its January 2015 correspondence, the FDA recommended that the primary endpoint of incident vertebral fracture reduction be performed excluding worsening vertebral fractures and including only new vertebral fractures. Using the FDA-recommended analysis, on the primary endpoint of reduction of new vertebral fractures (excluding worsening), abaloparatide-SC (n=690, fracture rate 0.58%) achieved a statistically significant 86% reduction as compared to the placebo-treated group (n=711, fracture rate 4.22%) ($p<0.0001$). The open-label teriparatide injection treatment group (n=717, fracture rate 0.84%) showed a statistically significant 80% reduction of new vertebral fractures (excluding worsening) as compared to the placebo-treated group ($p<0.0001$). The FDA also recommended, for the secondary endpoint of non-vertebral fractures, that our definition was generally acceptable provided that sternal (breast bone) and patellar (knee cap) fractures were excluded. In the previously announced top-line data for the secondary endpoint of non-vertebral fracture reduction noted above, we had excluded sternum and patella, and abaloparatide-SC (n=824, Kaplan-Meier estimated, or KM, fracture rate 2.7%) achieved a statistically significant reduction compared to the placebo-treated group (n=821, KM fracture rate 4.7%), and

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the hazard ratio for abaloparatide vs. placebo is 0.57 (p=0.0489); the open label teriparatide injection treatment group (n=818, KM fracture rate 3.3%) had a hazard ratio of 0.72 (p=NS) compared to the placebo-treated group. The FDA also recommended, for the secondary endpoint of bone mineral density, or BMD, that we use an ANCOVA approach with the last observation carried forward for missing data. The Mixed-Effect Model For Repeated Measures, or MMRM, method, which was used in the BMD secondary endpoint in the top-line data announced in December 2014, is to be applied for sensitivity analysis.

Corporate Information

Our principal executive offices are located at 950 Winter Street, Waltham, Massachusetts 02451, and our telephone number is (617) 551-4000. Our website address is *www.radiuspharm.com*. The information contained in, or accessible through, our website should not be considered a part of this prospectus supplement.

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THE OFFERING

Common stock offered by us	3,500,000 shares
Common stock to be outstanding immediately after this offering	36,376,321 shares (or 36,901,321 shares if the underwriters exercise their option to purchase additional shares in full)
Underwriters' option	The underwriters have a 30-day option to purchase up to 525,000 additional shares of our common stock.
Use of proceeds	We intend to use the net proceeds of this offering for the development of our product candidates and for other general corporate and working capital purposes. Please see "Use of Proceeds" on page S-8 of this prospectus supplement.
Risk factors	See "Risk Factors" beginning on page S-5 of this prospectus supplement, in the accompanying prospectus and in the documents incorporated by reference into this prospectus supplement and the accompanying prospectus, for a discussion of factors that you should read and consider before investing in our common stock.
NASDAQ Global Market symbol	"RDUS"

The number of shares of our common stock to be outstanding after this offering is based on 29,747,797 shares of our common stock outstanding as of September 30, 2014 and reflects the issuance of 3,128,524 shares of our common stock in connection with the public offering of our common stock in October 2014, and excludes:

- 2,377,693 shares of common stock issuable upon exercise of stock options outstanding as of September 30, 2014, at a weighted average exercise price of $7.22 per share;
- 1,871,640 shares of common stock reserved for issuance under our 2011 equity incentive plan as of September 30, 2014; and
- 1,379,671 shares of common stock issuable upon exercise of warrants outstanding as of September 30, 2014 at a weighted average exercise price of $13.97 per share.

Unless otherwise indicated, this prospectus supplement reflects and assumes the following:

- no exercise of the outstanding options and warrants described above; and
- no exercise by the underwriters of their option to purchase additional shares of our common stock.

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RISK FACTORS

Investing in our common stock involves a high degree of risk. Before investing in our common stock, you should consider carefully the risks described below, together with the other information contained in this prospectus supplement, the accompanying prospectus and the documents incorporated by reference herein or therein, including the risks and uncertainties discussed under "Risk Factors" in our Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2014, which are incorporated by reference into this prospectus supplement. If any of the risks incorporated by reference or set forth below occur, our business, financial condition, results of operations and future growth prospects could be materially and adversely affected. In these circumstances, the market price of our common stock could decline, and you may lose all or part of your investment.

Risks Related to this Offering

Purchasers in this offering will experience immediate and substantial dilution in the book value of their investment.

The public offering price of our common stock is substantially higher than the net tangible book value per share of our common stock before giving effect to this offering. Accordingly, if you purchase our common stock in this offering, you will incur immediate substantial dilution of approximately $33.73 per share, representing the difference between the public offering price and our as adjusted net tangible book value as of September 30, 2014, after giving effect to this offering and our public offering of 3,128,524 shares of common stock at $18.25 per share in October 2014. Furthermore, if outstanding options or warrants are exercised, you could experience further dilution. For a further description of the dilution that you will experience immediately after this offering, see the section in this prospectus supplement entitled "Dilution."

A substantial number of shares of common stock may be sold in the market following this offering, which may cause the market price of our common stock to decline.

Sales of a substantial number of shares of our common stock in the public market following this offering could cause the market price of our common stock to decline. A substantial number of the outstanding shares of our common stock are, and the shares of common stock sold in this offering upon issuance will be, freely tradable without restriction or further registration under the Securities Act of 1933, as amended.

Our directors and executive officers, together with their affiliates, have substantial influence over us and could delay or prevent a change in corporate control.

Our directors and executive officers, together with their affiliates, beneficially owned approximately 13.6 million shares of our common stock as of December 31, 2014. In January 2015, affiliates of one of our directors, Morana Jovan-Embiricos, Ph.D., distributed approximately 4.2 million shares of our common stock and warrants to purchase approximately 0.7 million shares of our common stock to their respective partners. Although our directors and executive officers, together with their affiliates, beneficially own a substantially lesser number of shares of our outstanding common stock after these distributions, these stockholders, acting together, would have the ability to significantly influence the outcome of matters submitted to our stockholders for approval, including the election of directors and any merger, consolidation or sale of all or substantially all of our assets. In addition, these stockholders, acting together, have the ability to significantly influence the management and affairs of our company. Accordingly, this concentration of ownership might harm the market price of our common stock by:

- delaying, deferring or preventing a change in corporate control;

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impeding a merger, consolidation, takeover or other business combination involving us; or

discouraging a potential acquirer from making a tender offer or otherwise attempting to obtain control of us.

We have broad discretion to determine how to use the funds raised in this offering, and may use them in ways that may not enhance our operating results or the market price of our common stock.

Our management will have broad discretion over the use of proceeds from this offering, and we could spend the proceeds from this offering in ways our stockholders may not agree with or that do not yield a favorable return, if at all. We intend to use the net proceeds from this offering for the development of our product candidates and for other general corporate and working capital purposes. However, our use of these proceeds may differ substantially from our current plans. If we do not invest or apply the proceeds of this offering in ways that improve our operating results, we may fail to achieve expected financial results, which could cause the market price of our common stock to decline.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus supplement, the accompanying prospectus and the documents that are incorporated by reference into this prospectus supplement and the accompanying prospectus, contain or incorporate by reference "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995, Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. You can generally identify these forward-looking statements by forward-looking words such as "anticipates," "believes," "expects," "intends," "future," "could," "estimates," "plans," "would," "should," "potential," "continues" and similar words or expressions (as well as other words or expressions referencing future events, conditions or circumstances). These forward-looking statements involve risks, uncertainties and other important factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements, including, but not limited to:

- the progress of, timing of and amount of expenses associated with our research, development and commercialization activities;
- the success of our clinical studies for our product candidates;
- our ability to obtain U.S. and foreign regulatory approval for our product candidates and the ability of our product candidates to meet existing or future regulatory standards;
- our expectations regarding federal, state and foreign regulatory requirements;
- the therapeutic benefits and effectiveness of our product candidates;
- the safety profile and related adverse events of our product candidates;
- our ability to manufacture sufficient amounts of abaloparatide, RAD1901, and RAD140 for commercialization activities with target characteristics following regulatory approvals;
- our plans with respect to collaborations and licenses related to the development, manufacture or sale of our product candidates;
- our expectations as to future financial performance, expense levels and liquidity sources;
- our ability to compete with other companies that are or may be developing or selling products that are competitive with our product candidates;
- anticipated trends and challenges in our potential markets; and
- our ability to attract and motivate key personnel.

All forward-looking statements contained herein are expressly qualified in their entirety by this cautionary statement, the risk factors set forth under the heading "Risk Factors" and elsewhere in this prospectus supplement, the accompanying prospectus and in the documents incorporated by reference into this prospectus supplement and the accompanying prospectus. These forward-looking statements speak only as of

the date of this prospectus supplement. Except to the extent required by applicable laws and regulations, we undertake no obligation to update these forward-looking statements to reflect new information, events or circumstances after the date of this prospectus supplement or to reflect the occurrence of unanticipated events. In light of these risks and uncertainties, the forward-looking events and circumstances described in this prospectus supplement may not occur and actual results could differ materially from those anticipated or implied in the forward-looking statements. Accordingly, you are cautioned not to place undue reliance on these forward-looking statements.

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USE OF PROCEEDS

We estimate that the net proceeds from this offering will be approximately $129.2 million (or approximately $148.7 million if the underwriters exercise their option to purchase additional shares in full), based on the offering price of $39.39 per share, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

A $1.00 increase (decrease) in the assumed public offering price of $39.39 per share would increase (decrease) our net proceeds from this offering by approximately $3.3 million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus supplement, remains the same and after deducting the estimated underwriting discounts and commissions. An increase (decrease) of one million shares in the number of shares offered by us, as set forth on the cover page of this prospectus supplement, would increase (decrease) our net proceeds from this offering by approximately $37.0 million, assuming no change in the assumed public offering price per share and after deducting estimated underwriting discounts and commissions.

We intend to use the net proceeds we receive from this offering to complete development of the investigational drug abaloparatide-SC, prepare applications seeking regulatory approvals for abaloparatide-SC in the United States and Europe and to continue to build commercial infrastructure, inventory and manufacturing capability for the commercialization of abaloparatide-SC, if approved, as well as to fund further development of our other product candidates, and for other general corporate and working capital purposes.

We have not determined the amounts we plan to spend in any of the areas identified above or the timing of these expenditures. As a result, our management will have broad discretion to allocate the net proceeds to us from this offering, and investors will be relying on the judgment of our management regarding the application of the proceeds from this offering. We reserve the right to change the use of these proceeds as a result of certain contingencies such as competitive developments, the results of our commercialization efforts, acquisition and investment opportunities and other factors. Pending use of the proceeds as described above, we intend to invest the net proceeds of this offering in short-term, interest-bearing, investment-grade securities or certificates of deposit.

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PRICE RANGE OF COMMON STOCK

Our common stock has been publicly traded on The NASDAQ Global Market under the symbol "RDUS" since our initial public offering on June 5, 2014. Prior to our initial public offering, there was no public market for our common stock. The following table sets forth, for the periods indicated, the high and low intraday sale prices of our common stock as reported by The NASDAQ Global Market.

	HIGH	LOW
2015		
First Quarter (through January 16, 2015)	$ 44.67	$ 38.12
2014		
Fourth Quarter (through December 31, 2014)	$ 42.57	$ 16.55
Third Quarter (through September 30, 2014)	$ 24.28	$ 8.09
Second Quarter (from June 5, 2014)	$ 14.60	$ 7.46

On January 16, 2015, the last reported sale price of our common stock on The NASDAQ Global Market was $39.39. As of January 15, 2015, there were 32,924,535 shares of our common stock outstanding held by approximately 61 holders of record.

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DIVIDEND POLICY

We have never declared or paid any cash dividends on our capital stock. We intend to retain future earnings, if any, to finance the operation and expansion of our business, and we do not anticipate paying any cash dividends in the foreseeable future. In addition, unless waived, the terms of our credit facility with Solar Capital Ltd. and Oxford Finance LLC limit our ability to pay cash dividends. Any future determination related to dividend policy will be made at the discretion of our board of directors after considering our financial condition, results of operations, capital requirements, business prospects and other factors the board of directors deems relevant, and subject to the restrictions contained in our current or future financing instruments.

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DILUTION

If you invest in our common stock in this offering, your ownership interest will be immediately diluted to the extent of the difference between the public offering price per share and the as adjusted net tangible book value per share of our common stock after this offering.

As of September 30, 2014, we had a net tangible book value of $23.4 million, or $0.79 per share of common stock. Our net tangible book value per share represents total tangible assets less total liabilities, divided by the number of shares of common stock outstanding at September 30, 2014. After giving effect to the issuance of 3,128,524 shares of our common stock in connection with our public offering of common stock in October 2014, and the net proceeds received in that offering, but prior to giving effect to the adjustments for this offering, we had an as adjusted tangible book value of $76.7 million, or $2.33 per share of common stock, as of September 30, 2014.

After giving further effect to the issuance and sale by us of 3,500,000 shares of common stock in this offering and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us, our as adjusted net tangible book value as of September 30, 2014 would have been approximately $206.0 million, or approximately $5.66 per share. This amount represents an immediate increase in as adjusted net tangible book value of $3.33 per share to our existing stockholders and an immediate dilution in as adjusted net tangible book value of approximately $33.73 per share to new investors purchasing shares of common stock in this offering.

Dilution per share to new investors is determined by subtracting as adjusted net tangible book value per share after this offering from the public offering price per share paid by new investors. The following table illustrates this dilution on a per share basis:

Assumed public offering price per share		$ 39.39
Net tangible book value per share as of September 30, 2014	$ 0.79	
Increase in tangible book value per share attributable to the October 2014 offering	1.54	
As adjusted net tangible book value per share as of September 30, 2014	2.33	
Increase in as adjusted net tangible book value per share attributable to this offering	3.33	
As adjusted net tangible book value per share after this offering		5.66
Dilution per share to new investors participating in this offering		$ 33.73

The information above assumes that the underwriters do not exercise their option to purchase additional shares. If the underwriters exercise their option in full, our as adjusted net tangible book value per share at September 30, 2014, after giving effect to this offering, would have been $6.11 per share, and the dilution in as adjusted net tangible book value per share to investors in this offering would have been $33.28 per share.

The above discussion and table are based on 29,747,797 shares of our common stock outstanding as of September 30, 2014, which does not include the following:

- 3,128,524 shares of common stock issued in connection with our public offering of common stock in October 2014;
- 2,377,693 shares of common stock issuable upon exercise of stock options outstanding as of September 30, 2014, at a weighted average exercise price of $7.22 per share;

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1,871,640 shares of common stock reserved for issuance under our 2011 equity incentive plan as of September 30, 2014; and

1,379,671 shares of common stock issuable upon exercise of warrants outstanding as of September 30, 2014, at a weighted average exercise price of $13.97 per share.

To the extent any of these outstanding options or warrants are exercised, there will be further dilution to new investors. If all of such outstanding options and warrants had been exercised as of September 30, 2014, the as adjusted net tangible book value per share after this offering would be $6.04 and total dilution per share to new investors would be $33.35.

The dilution information discussed above is illustrative only and will change based on the actual public offering price and other terms of this offering determined at pricing. A $1.00 increase (decrease) in the assumed public offering price of $39.39 per share would increase (decrease) our net tangible book value by $3.3 million, the net tangible book value per share after this offering by $0.09 and the dilution per share to new investors by $0.09, assuming the number of shares offered by us, as set forth on the cover page of this prospectus supplement, remains the same, and after deducting the estimated underwriting discounts and commissions. We may also increase or decrease the number of shares we are offering. An increase of one million in the number of shares offered by us would increase the as adjusted net tangible book value by approximately $37.0 million, or $0.84 per share, and would decrease the dilution per share to new investors in this offering by $0.84 per share, assuming that the assumed public offering price remains the same, and after deducting the estimated underwriting discounts and commissions. Similarly, a decrease of one million shares in the number of shares offered by us would decrease the as adjusted net tangible book value by approximately $37.0 million, or $0.89 per share, and would increase the dilution per share to new investors in this offering by $0.89 per share, assuming that the assumed public offering price remains the same, and after deducting the estimated underwriting discounts and commissions. The as adjusted information discussed above is illustrative only and will adjust based on the actual public offering price and other terms of this offering determined at pricing.

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UNDERWRITING

We and the underwriters named below have entered into an underwriting agreement with respect to the shares being offered. Subject to certain conditions, each underwriter has severally agreed to purchase the number of shares indicated in the following table. Goldman, Sachs & Co. and Merrill Lynch, Pierce, Fenner & Smith Incorporated are the representatives of the underwriters.

Underwriters	Number of Shares
Goldman, Sachs & Co	
Merrill Lynch, Pierce, Fenner & Smith Incorporated	
Cowen and Company, LLC	
Total	3,500,000

The underwriters are committed to take and pay for all of the shares being offered, if any are taken, other than the shares covered by the option described below unless and until this option is exercised.

The underwriters have an option to buy up to an additional 525,000 shares from us to cover sales by the underwriters of a greater number of shares than the total number set forth in the table above. They may exercise this option for 30 days. If any shares are purchased pursuant to this option, the underwriters will severally purchase shares in approximately the same proportion as set forth in the table above.

The following table shows the per share and total underwriting discounts and commissions to be paid to the underwriters by us. Such amounts are shown assuming both no exercise and full exercise of the underwriters' option to purchase 525,000 additional shares.

	No Exercise	Full Exercise
Per Share	$	$
Total	$	$

Shares sold by the underwriters to the public will initially be offered at the public offering price set forth on the cover of this prospectus supplement. Any shares sold by the underwriters to securities dealers may be sold at a discount of up to $ per share from the public offering price. After the initial offering of the shares, the representatives may change the offering price and the other selling terms. The offering of the shares by the underwriters is subject to receipt and acceptance and subject to the underwriters' right to reject any order in whole or in part.

We and our officers and directors, together with their affiliated entities, have agreed with the underwriters, subject to certain exceptions, not to dispose of or hedge any of our common stock or securities convertible into or exchangeable for shares of our common stock during the period from the date of this prospectus supplement continuing through the date 90 days after the date of this prospectus supplement, except with the prior written consent of the representatives. This agreement does not apply to any existing employee benefit plans.

Our common stock is publicly traded on The NASDAQ Global Market under the symbol "RDUS".

In connection with the offering, the underwriters may purchase and sell shares of common stock in the open market. These transactions may include short sales, stabilizing transactions and purchases to cover positions created by short sales. Short sales involve the sale by the underwriters of a greater number of shares than they are required to purchase in the offering, and a short position represents the amount of such sales that have not been covered by subsequent

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purchases. A "covered short position" is a short position that is not greater than the amount of additional shares for which the underwriters' option described above may be exercised. The underwriters may cover any covered short position by either exercising their option to purchase additional shares or purchasing shares in the open market. In determining the source of shares to cover the covered short position, the underwriters will consider, among other things, the price of shares available for purchase in the open market as compared to the price at which they may purchase additional shares pursuant to the option described above. "Naked" short sales are any short sales that create a short position greater than the amount of additional shares for which the option described above may be exercised. The underwriters must cover any such naked short position by purchasing shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the common stock in the open market after pricing that could adversely affect investors who purchase in the offering. Stabilizing transactions consist of various bids for or purchases of common stock made by the underwriters in the open market prior to the completion of the offering.

The underwriters may also impose a penalty bid. This occurs when a particular underwriter repays to the underwriters a portion of the underwriting discount received by it because the representatives have repurchased shares sold by or for the account of such underwriter in stabilizing or short covering transactions.

Purchases to cover a short position and stabilizing transactions, as well as other purchases by the underwriters for their own accounts, may have the effect of preventing or retarding a decline in the market price of our common stock, and together with the imposition of the penalty bid, may stabilize, maintain or otherwise affect the market price of our common stock. As a result, the price of our common stock may be higher than the price that otherwise might exist in the open market. The underwriters are not required to engage in these activities and may end any of these activities at any time. These transactions may be effected on The NASDAQ Global Market, in the over-the-counter market or otherwise.

The underwriters do not expect sales to discretionary accounts to exceed five percent of the total number of shares offered.

We estimate that our share of the total expenses of the offering, excluding underwriting discounts and commissions, will be approximately $350,000.

We have agreed to indemnify the several underwriters against certain liabilities, including liabilities under the Securities Act of 1933.

The underwriters and their respective affiliates are full service financial institutions engaged in various activities, which may include sales and trading, commercial and investment banking, advisory, investment management, investment research, principal investment, hedging, market making, brokerage and other financial and non-financial activities and services. Certain of the underwriters and their respective affiliates have provided, and may in the future provide, a variety of these services to us, and to persons and entities with relationships with us, for which they received or will receive customary fees and expenses.

In the ordinary course of their various business activities, the underwriters and their respective affiliates, officers, directors and employees may purchase, sell or hold a broad array of investments and actively trade securities, derivatives, loans, commodities, currencies, credit default swaps and other financial instruments for their own account and for the accounts of their customers, and such investment and trading activities may involve or relate to assets, securities and/or instruments of the Company (directly, as collateral securing other obligations or otherwise) and/or persons and entities with relationships with the Company. The underwriters and their respective affiliates may also communicate independent investment recommendations, market color or trading ideas and/or

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publish or express independent research views in respect of such assets, securities or instruments and may at any time hold, or recommend to clients that they should acquire, long and/or short positions in such assets, securities and instruments.

European Economic Area

In relation to each Member State of the European Economic Area which has implemented the Prospectus Directive (each, a Relevant Member State), each underwriter has represented and agreed that with effect from and including the date on which the Prospectus Directive is implemented in that Relevant Member State (the Relevant Implementation Date) it has not made and will not make an offer of shares to the public in that Relevant Member State prior to the publication of a prospectus in relation to the shares which has been approved by the competent authority in that Relevant Member State or, where appropriate, approved in another Relevant Member State and notified to the competent authority in that Relevant Member State, all in accordance with the Prospectus Directive, except that it may, with effect from and including the Relevant Implementation Date, make an offer of shares to the public in that Relevant Member State at any time:

(a) to legal entities which are authorised or regulated to operate in the financial markets or, if not so authorised or regulated, whose corporate purpose is solely to invest in securities;

(b) to any legal entity which has two or more of (1) an average of at least 250 employees during the last financial year; (2) a total balance sheet of more than €43,000,000; and (3) an annual net turnover of more than €50,000,000, as shown in its last annual or consolidated accounts;

(c) to fewer than 100 natural or legal persons (other than qualified investors as defined in the Prospectus Directive) subject to obtaining the prior consent of the representatives for any such offer; or

(d) in any other circumstances that do not require the publication by the Company of a prospectus pursuant to Article 3 of the Prospectus Directive.

For the purposes of this provision, the expression an "offer of shares to the public" in relation to any shares in any Relevant Member State means the communication in any form and by any means of sufficient information on the terms of the offer and the shares to be offered so as to enable an investor to decide to purchase or subscribe the shares, as the same may be varied in that Relevant Member State by any measure implementing the Prospectus Directive in that Relevant Member State and the expression Prospectus Directive means Directive 2003/71/EC and includes any relevant implementing measure in each Relevant Member State.

United Kingdom

Each underwriter has represented and agreed that:

(a) it has only communicated or caused to be communicated, and will only communicate or cause to be communicated, an invitation or inducement to engage in investment activity (within the meaning of Section 21 of the Financial Services and Markets Act 2000, or the FSMA) received by it in connection with the issue or sale of the shares in circumstances in which Section 21(1) of the FSMA does not apply to the Company; and

(b) it has complied and will comply with all applicable provisions of the FSMA with respect to anything done by it in relation to the shares in, from or otherwise involving the United Kingdom.

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Hong Kong

The shares may not be offered or sold by means of any document other than (a) in circumstances which do not constitute an offer to the public within the meaning of the Companies Ordinance (Cap. 32, Laws of Hong Kong), or (b) to "professional investors" within the meaning of the Securities and Futures Ordinance (Cap. 571, Laws of Hong Kong) and any rules made thereunder, or (c) in other circumstances which do not result in the document being a "prospectus" within the meaning of the Companies Ordinance (Cap. 32, Laws of Hong Kong), and no advertisement, invitation or document relating to the shares may be issued or may be in the possession of any person for the purpose of issue (in each case whether in Hong Kong or elsewhere), which is directed at, or the contents of which are likely to be accessed or read by, the public in Hong Kong (except if permitted to do so under the laws of Hong Kong) other than with respect to shares which are, or are intended to be, disposed of only to persons outside Hong Kong or only to "professional investors" within the meaning of the Securities and Futures Ordinance (Cap. 571, Laws of Hong Kong) and any rules made thereunder.

Singapore

This prospectus supplement and the accompanying prospectus have not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus supplement, the accompanying prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of the shares may not be circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (a) to an institutional investor under Section 274 of the Securities and Futures Act, Chapter 289 of Singapore, or the SFA, (b) to a relevant person, or any person pursuant to Section 275(1A) of the SFA, and in accordance with the conditions specified in Section 275 of the SFA, or (c) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA.

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is: (i) a corporation (which is not an accredited investor) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or (ii) a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary is an accredited investor, shares, debentures and units of shares and debentures of that corporation or the beneficiaries' rights and interest in that trust shall not be transferable for six months after that corporation or that trust has acquired the shares under Section 275 of the SFA except: (1) to an institutional investor under Section 274 of the SFA, or to a relevant person, or any person pursuant to Section 275(1A) of the SFA, and in accordance with the conditions specified in Section 275 of the SFA; (2) where no consideration is given for the transfer; or (3) by operation of law.

Japan

The securities have not been and will not be registered under the Financial Instruments and Exchange Law of Japan, or the Financial Instruments and Exchange Law, and each underwriter has agreed that it will not offer or sell any securities, directly or indirectly, in Japan or to, or for the benefit of, any resident of Japan (which term as used herein means any person resident in Japan, including any corporation or other entity organized under the laws of Japan), or to others for re-offering or resale, directly or indirectly, in Japan or to a resident of Japan, except pursuant to an exemption from the registration requirements of, and otherwise in compliance with, the Financial Instruments and Exchange Law and any other applicable laws, regulations and ministerial guidelines of Japan.

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Switzerland

The shares may not be publicly offered in Switzerland and will not be listed on the SIX Swiss Exchange ("SIX") or on any other stock exchange or regulated trading facility in Switzerland. This document has been prepared without regard to the disclosure standards for issuance prospectuses under art. 652a or art. 1156 of the Swiss Code of Obligations or the disclosure standards for listing prospectuses under art. 27 ff. of the SIX Listing Rules or the listing rules of any other stock exchange or regulated trading facility in Switzerland. Neither this document nor any other offering or marketing material relating to the shares or the offering may be publicly distributed or otherwise made publicly available in Switzerland.

Neither this document nor any other offering or marketing material relating to the offering, the Company, the shares have been or will be filed with or approved by any Swiss regulatory authority. In particular, this document will not be filed with, and the offer of shares will not be supervised by, the Swiss Financial Market Supervisory Authority FINMA (FINMA), and the offer of shares has not been and will not be authorized under the Swiss Federal Act on Collective Investment Schemes ("CISA"). The investor protection afforded to acquirers of interests in collective investment schemes under the CISA does not extend to acquirers of shares.

Dubai International Financial Centre

This prospectus supplement relates to an Exempt Offer in accordance with the Offered Securities Rules of the Dubai Financial Services Authority ("DFSA"). This prospectus supplement is intended for distribution only to persons of a type specified in the Offered Securities Rules of the DFSA. It must not be delivered to, or relied on by, any other person. The DFSA has no responsibility for reviewing or verifying any documents in connection with Exempt Offers. The DFSA has not approved this prospectus supplement nor taken steps to verify the information set forth herein and has no responsibility for the prospectus supplement. The shares to which this prospectus supplement relates may be illiquid and/or subject to restrictions on their resale. Prospective purchasers of the shares offered should conduct their own due diligence on the shares. If you do not understand the contents of this prospectus supplement you should consult an authorized financial advisor.

Australia

No placement document, prospectus, product disclosure statement or other disclosure document has been lodged with the Australian Securities and Investments Commission ("ASIC"), in relation to the offering. This prospectus does not constitute a prospectus, product disclosure statement or other disclosure document under the Corporations Act 2001 (the "Corporations Act"), and does not purport to include the information required for a prospectus, product disclosure statement or other disclosure document under the Corporations Act.

Any offer in Australia of the shares may only be made to persons (the "Exempt Investors") who are "sophisticated investors" (within the meaning of section 708(8) of the Corporations Act), "professional investors" (within the meaning of section 708(11) of the Corporations Act) or otherwise pursuant to one or more exemptions contained in section 708 of the Corporations Act so that it is lawful to offer the shares without disclosure to investors under Chapter 6D of the Corporations Act.

The shares applied for by Exempt Investors in Australia must not be offered for sale in Australia in the period of 12 months after the date of allotment under the offering, except in circumstances where disclosure to investors under Chapter 6D of the Corporations Act would not be required pursuant to an exemption under section 708 of the Corporations Act or otherwise or

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where the offer is pursuant to a disclosure document which complies with Chapter 6D of the Corporations Act. Any person acquiring shares must observe such Australian on-sale restrictions.

This prospectus contains general information only and does not take account of the investment objectives, financial situation or particular needs of any particular person. It does not contain any securities recommendations or financial product advice. Before making an investment decision, investors need to consider whether the information in this prospectus is appropriate to their needs, objectives and circumstances, and, if necessary, seek expert advice on those matters.

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LEGAL MATTERS

The validity of the shares of common stock offered hereby will be passed upon for us by Latham & Watkins LLP. Ropes & Gray LLP is counsel to the underwriters in connection with this offering.

EXPERTS

The financial statements of Radius Health, Inc. appearing in Radius Health, Inc.'s Annual Report (Form 10-K) for the year ended December 31, 2013 have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their report thereon, included therein, and incorporated herein by reference. Such financial statements are, and audited financial statements included in subsequently filed documents will be, incorporated herein in reliance upon the report of Ernst & Young LLP pertaining to such financial statements (to the extent covered by consents filed with the Securities and Exchange Commission) given on the authority of such firm as experts in accounting and auditing.

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WHERE YOU CAN FIND MORE INFORMATION; INCORPORATION BY REFERENCE

Available Information

We file reports, proxy statements and other information with the SEC. Information filed with the SEC by us can be inspected and copied at the Public Reference Room maintained by the SEC at 100 F Street, N.E., Washington, D.C. 20549. You may also obtain copies of this information by mail from the Public Reference Section of the SEC at prescribed rates. Further information on the operation of the SEC's Public Reference Room in Washington, D.C. can be obtained by calling the SEC at 1-800-SEC-0330. The SEC also maintains a website that contains reports, proxy and information statements, and other information about issuers, such as us, who file electronically with the SEC. The address of that website is *http://www.sec.gov*.

Our website address is *www.radiuspharm.com*. The information contained in, or accessible through, our website, however, should not be considered a part of this prospectus supplement.

This prospectus supplement and the accompanying prospectus are part of a registration statement that we filed with the SEC and do not contain all of the information in the registration statement. The full registration statement may be obtained from the SEC or us, as provided below. Other documents establishing the terms of the offered securities are or may be filed as exhibits to the registration statement. Statements in this prospectus supplement or the accompanying prospectus about these documents are summaries, and each such statement is qualified in all respects by reference to the document to which it refers. You should refer to the actual documents for a more complete description of the relevant matters. You may inspect a copy of the registration statement at the SEC's Public Reference Room in Washington, D.C. or through the SEC's website, as provided above.

Incorporation by Reference

The SEC's rules allow us to "incorporate by reference" information into this prospectus supplement and the accompanying prospectus, which means that we can disclose important information to you by referring you to another document filed separately with the SEC. The information incorporated by reference is deemed to be part of this prospectus supplement and the accompanying prospectus, and subsequent information that we file with the SEC will automatically update and supersede that information. Any statement contained in a previously filed document incorporated by reference will be deemed to be modified or superseded for purposes of this prospectus supplement and the accompanying prospectus to the extent that a statement contained in this prospectus supplement or the accompanying prospectus modifies or replaces that statement.

We incorporate by reference the following information or documents that we have filed with the SEC:

Our Annual Report on Form 10-K for the fiscal year ended December 31, 2013, filed with the SEC on February 26, 2014, as amended by our Amendment No. 1 to Annual Report on Form 10-K/A for the fiscal year ended December 31, 2013, filed with the SEC on April 3, 2014.

Our Quarterly Report on Form 10-Q for the quarterly period ended March 31, 2014, filed with the SEC on May 14, 2014, our Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2014, filed with the SEC on August 12, 2014, and our Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2014, filed with the SEC on November 10, 2014.

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Our Current Reports on Form 8-K filed with the SEC on January 7, 2014, January 8, 2014, February 3, 2014, February 11, 2014, February 21, 2014, February 28, 2014, March 10, 2014, April 1, 2014, April 30, 2014, May 20, 2014, June 2, 2014, June 13, 2014, July 11, 2014, October 1, 2014, October 2, 2014, November 3, 2014 and January 12, 2015.

The description of our Common Stock contained in our Registration Statement on Form 8-A, dated and filed with the SEC on May 2, 2014, and any amendment or report filed with the SEC for the purpose of updating such description.

We incorporate by reference into this prospectus supplement and accompanying prospectus all reports and other documents we subsequently file with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended, between the date of this prospectus supplement and the termination of the offering of the securities described in this prospectus supplement. We are not, however, incorporating by reference any documents or portions thereof, whether specifically listed above or filed in the future, that are not deemed "filed" with the SEC, including any information furnished pursuant to Items 2.02 or 7.01 of Form 8-K or related exhibits furnished pursuant to Item 9.01 of Form 8-K. The reports and documents specifically listed above or filed in the future (excluding any information furnished to, rather than filed with, the SEC) are deemed to be part of this prospectus supplement and accompanying prospectus from the date of the filing of such reports and documents.

You may request a free copy of any of the documents incorporated by reference into this prospectus supplement or the accompanying prospectus (other than exhibits, unless they are specifically incorporated by reference into this prospectus supplement or the accompanying prospectus) by writing or telephoning us at the following address:

Radius Health, Inc.
950 Winter St.
Waltham, MA 02451
(617) 551-4000
Attention: Investor Relations

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PROSPECTUS

Radius Health, Inc.

Common Stock
Preferred Stock
Warrants
Units
Offered by Radius Health

Common Stock
Offered by the Selling Securityholders

We may offer and sell the securities identified above, and the selling securityholders may offer and sell shares of common stock identified above, from time to time in one or more offerings. This prospectus provides you with a general description of the securities. We will not receive any proceeds from the sale of our common stock by the selling securityholders.

Each time we or any of the selling securityholders offer and sell securities, we or such selling securityholders will provide a supplement to this prospectus that contains specific information about the offering and, if applicable, the selling securityholders, as well as the amounts, prices and terms of the securities. The supplement may also add, update or change information contained in this prospectus with respect to that offering. You should carefully read this prospectus and the applicable prospectus supplement before you invest in any of our securities.

We may offer and sell the securities described in this prospectus and any prospectus supplement to or through one or more underwriters, dealers and agents, or directly to purchasers, or through a combination of these methods. In addition, the selling securityholders may offer and sell shares of our common stock from time to time, together or separately. If any underwriters, dealers or agents are involved in the sale of any of the securities, their names and any applicable purchase price, fee, commission or discount arrangement between or among them will be set forth, or will be calculable from the information set forth, in the applicable prospectus supplement. See the sections of this prospectus entitled "About this Prospectus" and "Plan of Distribution" for more information. No securities may be sold without delivery of this prospectus and the applicable prospectus supplement describing the method and terms of the offering of such securities.

INVESTING IN OUR SECURITIES INVOLVES RISKS. SEE THE "RISK FACTORS" ON PAGE 5 OF THIS PROSPECTUS AND ANY SIMILAR SECTION CONTAINED IN THE APPLICABLE PROSPECTUS SUPPLEMENT CONCERNING FACTORS YOU SHOULD CONSIDER BEFORE INVESTING IN OUR SECURITIES.

Our common stock is listed on The NASDAQ Global Market under the symbol "RDUS." On January 16, 2015, the last reported sale price of our common stock on The NASDAQ Global Market was $39.39 per share.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

The date of this prospectus is January 20, 2015.

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement that we filed with the U.S. Securities and Exchange Commission, or the SEC, as a "well-known seasoned issuer" as defined in Rule 405 under the Securities Act of 1933, as amended, using a "shelf" registration process. By using a shelf registration statement, we may sell securities from time to time and in one or more offerings and the selling securityholders to be named in a supplement to this prospectus may, from time to time, sell shares of common stock from time to time in one or more offerings as described in this prospectus. Each time that we or the selling securityholders offer and sell securities, we or the selling securityholders will provide a prospectus supplement to this prospectus that contains specific information about the securities being offered and sold and the specific terms of that offering. The prospectus supplement may also add, update or change information contained in this prospectus with respect to that offering. If there is any inconsistency between the information in this prospectus and the applicable prospectus supplement, you should rely on the prospectus supplement. Before purchasing any securities, you should carefully read both this prospectus and the applicable prospectus supplement, together with the additional information described under the heading "Where You Can Find More Information; Incorporation by Reference."

Neither we, nor the selling securityholders, have authorized any other person to provide you with different information. If anyone provides you with different or inconsistent information, you should not rely on it. We and the selling securityholders will not make an offer to sell these securities in any jurisdiction where the offer or sale is not permitted. You should assume that the information appearing in this prospectus and the applicable prospectus supplement to this prospectus is accurate as of the date on its respective cover, and that any information incorporated by reference is accurate only as of the date of the document incorporated by reference, unless we indicate otherwise. Our business, financial condition, results of operations and prospects may have changed since those dates.

When we refer to "Radius," "we," "our," "us" and the "Company" in this prospectus, we mean Radius Health, Inc., unless otherwise specified. When we refer to "you," we mean the holders of the applicable series of securities.

Our logo, trademarks and service marks are the property of Radius. Other trademarks or service marks appearing in this prospectus are the property of their respective holders.

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WHERE YOU CAN FIND MORE INFORMATION; INCORPORATION BY REFERENCE

Available Information

We file reports, proxy statements and other information with the SEC. Information filed with the SEC by us can be inspected and copied at the Public Reference Room maintained by the SEC at 100 F Street, N.E., Washington, D.C. 20549. You may also obtain copies of this information by mail from the Public Reference Room of the SEC at prescribed rates. Further information on the operation of the SEC's Public Reference Room in Washington, D.C. can be obtained by calling the SEC at 1-800-SEC-0330. The SEC also maintains a web site that contains reports, proxy and information statements and other information about issuers, such as us, who file electronically with the SEC. The address of that website is *http://www.sec.gov*.

Our website address is www.radiuspharm.com. The information on our web site, however, is not, and should not be deemed to be, a part of this prospectus.

This prospectus and any prospectus supplement are part of a registration statement that we filed with the SEC and do not contain all of the information in the registration statement. The full registration statement may be obtained from the SEC or us, as provided below. Other documents establishing the terms of the offered securities are or may be filed as exhibits to the registration statement. Statements in this prospectus or any prospectus supplement about these documents are summaries and each statement is qualified in all respects by reference to the document to which it refers. You should refer to the actual documents for a more complete description of the relevant matters. You may inspect a copy of the registration statement at the SEC's Public Reference Room in Washington, D.C. or through the SEC's website, as provided above.

Incorporation by Reference

The SEC's rules allow us to "incorporate by reference" information into this prospectus, which means that we can disclose important information to you by referring you to another document filed separately with the SEC. The information incorporated by reference is deemed to be part of this prospectus, and subsequent information that we file with the SEC will automatically update and supersede that information. Any statement contained in a previously filed document incorporated by reference will be deemed to be modified or superseded for purposes of this prospectus to the extent that a statement contained in this prospectus modifies or replaces that statement.

We incorporate by reference our documents listed below and any future filings made by us with the SEC under Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended, which we refer to as the "Exchange Act" in this prospectus, between the date of this prospectus and the termination of the offering of the securities described in this prospectus. We are not, however, incorporating by reference any documents or portions thereof, whether specifically listed below or filed in the future, that are not deemed "filed" with the SEC, including our Compensation Committee report and performance graph or any information furnished pursuant to Items 2.02 or 7.01 of Form 8-K or related exhibits furnished pursuant to Item 9.01 of Form 8-K.

This prospectus and any accompanying prospectus supplement incorporate by reference the documents set forth below that have previously been filed with the SEC:

Our Annual Report on Form 10-K for the year ended December 31, 2013, filed with the SEC on February 26, 2014, as amended by Amendment No. 1 to Annual Report on Form 10-K/A for the year ended December 31, 2013, filed with the SEC on April 3, 2014.

Our Quarterly Report on Form 10-Q for the quarter ended March 31, 2014, filed with the SEC on May 14, 2014, our Quarterly Report on Form 10-Q for the quarter ended June 30, 2014, filed

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with the SEC on August 12, 2014, and our Quarterly Report on Form 10-Q for the quarter ended September 30, 2014, filed with the SEC on November 10, 2014.

Our Current Reports on Form 8-K filed with the SEC on January 7, 2014, January 8, 2014, February 3, 2014, February 11, 2014, February 21, 2014, February 28, 2014, March 10, 2014, April 1, 2014, April 30, 2014, May 20, 2014, June 2, 2014, June 13, 2014, July 11, 2014, October 1, 2014, October 2, 2014, November 3, 2014 and January 12, 2015.

The description of our Common Stock contained in our Registration Statement on Form 8-A, dated and filed with the SEC on May 2, 2014, and any amendment or report filed with the SEC for the purpose of updating the description.

All reports and other documents we subsequently file pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act prior to the termination of this offering, but excluding any information furnished to, rather than filed with, the SEC, will also be incorporated by reference into this prospectus and deemed to be part of this prospectus from the date of the filing of such reports and documents.

You may request a free copy of any of the documents incorporated by reference in this prospectus (other than exhibits, unless they are specifically incorporated by reference in the documents) by writing or telephoning us at the following address:

Radius Health, Inc.
950 Winter St.
Waltham, MA 02451
(617) 551-4000
Attention: Investor Relations

Exhibits to the filings will not be sent, however, unless those exhibits have specifically been incorporated by reference in this prospectus and any accompanying prospectus supplement.

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THE COMPANY

We are a science driven biopharmaceutical company focused on developing new therapeutics for patients with osteoporosis as well as other serious endocrine mediated diseases. Our lead development candidate is the investigational drug abaloparatide (BA058), a bone anabolic for the potential treatment of osteoporosis delivered via subcutaneous injection, which we refer to as abaloparatide-SC. We announced the 18-month top line data from our Phase 3 clinical trial evaluating abaloparatide-SC for potential use in the reduction of fractures in postmenopausal osteoporosis in December 2014. Patients from the abaloparatide and placebo groups from our Phase 3 clinical trial are eligible to continue in a six-month extension study, in which they are receiving an approved alendronate therapy for osteoporosis management. We currently anticipate the first results from the ongoing six-month extension study to be available in the first quarter of 2015. Following completion of the extension study, we plan to submit a new drug application, or NDA, in the United States, and a marketing authorization application, or MAA, in Europe, during the second half of 2015. We hold worldwide commercialization rights to abaloparatide-SC, other than in Japan, and subject to a regulatory review and favorable regulatory outcome, we anticipate our first commercial sales of abaloparatide-SC will take place in 2016. We are leveraging our investment in abaloparatide-SC to develop a line extension that is designed to improve patient convenience by enabling administration of abaloparatide through an investigational short wear time transdermal patch, which we refer to as abaloparatide-TD.

Our current clinical product portfolio also includes the investigational drug RAD1901, a selective estrogen receptor down regulator/degrader, or SERD, and the investigational drug RAD140, a nonsteroidal selective androgen receptor modulator, or SARM. We are developing RAD1901 at higher doses for the potential treatment of metastatic breast cancer, and intend to advance its development with the initiation of Phase 1 clinical trials, including a maximum tolerated dose study that has commenced patient dosing and a Phase 1 clinical trial in metastatic breast cancer patients that, as of the date of this prospectus supplement, is open for patient screening and enrollment. At lower doses, RAD1901 acts as a selective estrogen-receptor modulator, or SERM. Low-dose RAD1901 has shown potential to be effective for the treatment of vasomotor symptoms such as hot flashes in a successful Phase 2 proof of concept study. We intend to commence a Phase 2b clinical trial in vasomotor symptoms in the second half of 2015.

We were incorporated in Delaware on February 4, 2008 under the name MPM Acquisition Corp. In May 2011, we entered into a reverse merger transaction, or the Merger, with our predecessor, Radius Health, Inc., a Delaware corporation formed on October 3, 2003, or the Former Operating Company. Pursuant to the Merger, the Former Operating Company became a wholly-owned subsidiary of ours. Immediately following the Merger, we merged the Former Operating Company with and into us, and we assumed the business of the Former Operating Company and changed our name to "Radius Health, Inc."

Our principal executive offices are located at 950 Winter Street, Waltham, Massachusetts 02451, and our telephone number is (617) 551-4000. Our website address is *www.radiuspharm.com*. The information on our web site, however, is not, and should not be deemed to be, a part of this prospectus.

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RISK FACTORS

Investment in any securities offered pursuant to this prospectus and the applicable prospectus supplement involves risks. You should carefully consider the risk factors incorporated by reference to our most recent Annual Report on Form 10-K and any subsequent Quarterly Reports on Form 10-Q or Current Reports on Form 8-K we file after the date of this prospectus, and all other information contained or incorporated by reference into this prospectus, as updated by our subsequent filings under the Exchange Act, and the risk factors and other information contained in the applicable prospectus supplement before acquiring any of such securities. The occurrence of any of these risks might cause you to lose all or part of your investment in the offered securities.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference in this prospectus and any prospectus supplement or free writing prospectus include forward-looking statements within the meaning of Section 27A of the Securities Act and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. All statements other than statements of historical fact included in this prospectus that address activities, events or developments that we expect, believe or anticipate will or may occur in the future are forward-looking statements including, in particular, the statements about our plans, objectives, strategies and prospects regarding, among other things, our financial condition, operating results and business.

We have identified some of these forward-looking statements with words like "believe," "may," "will," "should," "could," "expect," "intend," "plan," "predict," "anticipate," "estimate," "continue" or other words and terms of similar meaning and the use of future dates. These forward-looking statements are based on current expectations about future events affecting us and are subject to uncertainties and important factors relating to our operations and business environment, all of which are difficult to predict and many of which are beyond our control and could cause our actual results to differ materially from those matters expressed or implied by our forward-looking statements. Forward-looking statements are only predictions or statements of current plans and can be affected by inaccurate assumptions we might make or by known or unknown risks and uncertainties, including the risks described under the heading "Risk Factors" in our Quarterly Report on Form 10-Q for the quarter ended September 30, 2014, which is incorporated herein by reference in its entirety, any amendment or update thereto reflected in subsequent filings with the SEC, and all other annual, quarterly and other reports that we file with the SEC after the date of this prospectus and that also are incorporated herein by reference. Such risks and uncertainties are not exclusive and further information concerning us and our business, including factors that potentially could materially affect our financial results or condition, may emerge from time to time. We assume no obligation to update, amend or clarify forward-looking statements to reflect actual results or changes in factors or assumptions affecting such forward-looking statements, except as otherwise required by law. We advise you, however, to consult any further disclosures we make on related subjects in our future annual reports on Form 10-K, quarterly reports on Form 10-Q and current reports on Form 8-K we file with or furnish to the SEC.

USE OF PROCEEDS

We intend to use the net proceeds from the sale of the securities as set forth in the applicable prospectus supplement. We will not receive any of the proceeds from the sale of common stock being offered by any of the selling securityholders.

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SELECTED FINANCIAL DATA

You should read the following selected financial data together with our financial statements and the related notes contained in Item 8 of Part II of our Annual Report on Form 10-K/A for the fiscal year ended December 31, 2013 and our financial statements and the related notes contained in Item 1 of Part I of our Quarterly Report on Form 10-Q for the quarter ended September 30, 2014, which are incorporated by reference into this prospectus, except that share and per share information for the periods ended December 31, 2013, 2012, 2011, 2010 and 2009 have been revised to reflect the one-for-2.28 reverse stock split for our outstanding shares of common stock effective April 24, 2014. The selected data in this section is not intended to replace the consolidated financial statements included in our Annual Report on Form 10-K/A, except that share and per share information for the periods ended December 31, 2013, 2012, 2011, 2010 and 2009 have been revised to reflect the one-for-2.28 reverse stock split.

We have derived the statements of operations data for each of the three years ended December 31, 2011, 2012 and 2013 and the balance sheet data as of December 31, 2012 and 2013 from the audited financial statements contained in Item 8 of Part II of our Annual Report on Form 10-K/A for the year ended December 31, 2013. The selected balance sheet data as of December 31, 2009, 2010 and 2011 and the statement of operations data for the years ended December 31, 2009 and 2010 has been derived from the audited financial statements for such years not included in our Annual Report on Form 10-K/A for the year ended December 31, 2013. The consolidated statement of operations data set forth below for the nine months ended September 30, 2014 and the consolidated balance sheet data as of September 30, 2014 have been derived from our financial statements included in Item 1 of Part I of our Quarterly Report on Form 10-Q for the quarter ended September 30, 2014, which is incorporated by reference into this prospectus.

The financial information set forth below for the years ended December 31, 2009, 2010 and 2011 have been recast to reflect the adoption of Accounting Standards Update No. 2011-05, Presentation of Comprehensive Income.

The historical financial information set forth below may not be indicative of our future performance and should be read together with "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our historical financial statements and notes to those statements included in Item 7 of Part II and Item 8 of Part II, respectively, of our Annual Report on Form 10-K/A for the year ended December 31, 2013, "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our historical financial statements and notes to those statements included in Item 2 of Part I and Item 1 of Part I, respectively, of our Quarterly Report on Form 10-Q for the quarter ended September 30, 2014, and any amendment or update thereto reflected in subsequent filings with the SEC, and all other annual, quarterly and other reports

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that we file with the SEC after the date of this prospectus and that also are incorporated herein by reference.

	Year Ended December 31,					Nine Months Ended September 30,	
Statement of Operations and Comprehensive Loss Data	**2013**	**2012**	**2011**	**2010**	**2009**	**2014**	**2013**
			(in thousands)			**(unaudited)**	
Revenue:							
Option fee	$	$	$	$	$ 1,616	$	$
Operating expenses:							
Research and development	60,536	54,961	36,179	11,692	14,519	34,152	49,070
General and administrative	6,829	9,469	5,330	3,630	2,668	8,045	4,643
Restructuring				217			
Loss from operations	(67,365)	(64,430)	(41,509)	(15,539)	(15,571)	(42,197)	(53,713)
Other income (expense):							
Other income (expense), net	9,085	(2,095)	(236)	824	(7)	(506)	7,465
Loss on retirement of note payable						(203)	
Interest (expense) income, net	(2,410)	(2,603)	(731)	85	489	(1,611)	(1,911)
Net loss	(60,690)	(69,128)	(42,476)	(14,630)	(15,089)	(44,517)	(48,159)
Other comprehensive loss, net of tax:							
Unrealized (loss) gain from available-for-sale securities		(5)	8	(18)	(232)	(10)	
Comprehensive loss	$ (60,690)	$ (69,133)	$ (42,468)	$ (14,648)	$ (15,321)	$ (44,527)	$ (48,159)