

Radius Health, Inc.
Form 424B5
July 21, 2015

Use these links to rapidly review the document

[Table of contents](#)

[Table of Contents](#)

Filed Pursuant to Rule 424(b)(5)
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 July 21, 2015

**Preliminary prospectus supplement
(To Prospectus dated January 20, 2015)**

\$250,000,000

Common Stock

We are offering \$250,000,000 of shares of our common stock.

Our common stock is listed on The NASDAQ Global Market under the symbol "RDUS." The last reported sale price of our common stock on The NASDAQ Global Market on July 20, 2015 was \$78.86 per share.

Investing in our common stock involves risks. See "Risk factors" beginning on page S-4 of this prospectus supplement, as well as those contained in the documents incorporated herein.

	Per share	Total
Public offering price	\$	\$
Underwriting discount(1)	\$	\$

Edgar Filing: Radius Health, Inc. - Form 424B5

Proceeds, before expenses, to Radius Health, Inc. \$ \$

(1) We have agreed to reimburse the underwriters for certain FINRA-related expenses. See "Underwriting" beginning on page S-12 of this prospectus supplement.

We have granted the underwriters the right to purchase up to an additional \$37,500,000 of shares of our common stock at the public offering price less the underwriting discount and commissions. The underwriters can exercise this right at any time within 30 days after the date of this prospectus supplement.

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.

The underwriters expect to deliver the shares of common stock to investors on or about _____, 2015.

J.P. Morgan

BofA Merrill Lynch

Deutsche Bank Securities

Cowen and Company

Prospectus Supplement dated _____, 2015.

Table of Contents**Table of contents****Prospectus supplement**

	Page
<u>About this prospectus supplement</u>	<u>S-ii</u>
<u>Prospectus supplement summary</u>	<u>S-1</u>
<u>Risk factors</u>	<u>S-4</u>
<u>Special note regarding forward-looking statements</u>	<u>S-6</u>
<u>Use of proceeds</u>	<u>S-7</u>
<u>Price range of common stock</u>	<u>S-8</u>
<u>Dividend policy</u>	<u>S-9</u>
<u>Dilution</u>	<u>S-10</u>
<u>Underwriting</u>	<u>S-12</u>
<u>Legal matters</u>	<u>S-18</u>
<u>Experts</u>	<u>S-18</u>
<u>Where you can find more information; incorporation by reference</u>	<u>S-19</u>

Accompanying prospectus

	Page
<u>About this prospectus</u>	<u>1</u>
<u>Where you can find more information; incorporation by reference</u>	<u>2</u>
<u>The company</u>	<u>4</u>
<u>Risk factors</u>	<u>5</u>
<u>Special note regarding forward-looking statements</u>	<u>5</u>
<u>Use of proceeds</u>	<u>5</u>
<u>Selected financial data</u>	<u>6</u>
<u>Ratio of earnings to fixed charges and preferred share dividends</u>	<u>8</u>
<u>Description of capital stock</u>	<u>9</u>
<u>Description of other securities</u>	<u>12</u>
<u>Global securities</u>	<u>13</u>
<u>Selling securityholders</u>	<u>16</u>
<u>Plan of distribution</u>	<u>17</u>
<u>Legal matters</u>	<u>18</u>
<u>Experts</u>	<u>18</u>

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.

Table of Contents

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-19 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 Annual Report on Form 10-K for the fiscal year ended December 31, 2014, our Quarterly Report on Form 10-Q for the quarterly period ended March 31, 2015 and our Current Reports on Form 8-K, 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., a Delaware corporation.

Table of Contents

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-4 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 Annual Report on Form 10-K for the fiscal year ended December 31, 2014 and our Quarterly Report on Form 10-Q for the quarterly period ended March 31, 2015, as updated by our subsequent filings under the Securities Exchange Act of 1934, as amended.

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, including hormone responsive breast cancer. Our lead product candidate is the investigational drug abaloparatide, a bone anabolic for potential use in the reduction of fracture risk in postmenopausal women with severe osteoporosis. We are developing two formulations of abaloparatide: abaloparatide-SC, an injectable subcutaneous formulation of abaloparatide, and abaloparatide-TD, a line extension of abaloparatide-SC in the form of a convenient, short-wear-time transdermal patch.

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 potential use in the treatment of metastatic breast cancer and other estrogen receptor mediated applications. We are currently enrolling a Phase 1, multicenter, open-label, two-part, dose-escalation study of RAD1901 in postmenopausal women with advanced estrogen receptor positive and HER2-negative breast cancer. 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. RAD140 resulted from an internal drug discovery program focused on the androgen receptor pathway which is highly expressed in many breast cancers. Due to its receptor and tissue selectivity, potent oral activity and long duration half-life, RAD140 could have clinical potential in the treatment of breast cancer or possibly other conditions where androgen modulation may offer therapeutic benefit.

Recent developments

Abaloparatide

In December 2014, we announced the 18-month top-line data from our Phase 3 ACTIVE clinical trial of abaloparatide-SC. The study was designed to evaluate whether abaloparatide-SC is superior to placebo for prevention of vertebral fracture. The top-line results of the 18-month ACTIVE clinical trial showed that abaloparatide-SC met the primary endpoint with a statistically significant 86% reduction in new vertebral fractures versus placebo, and teriperatide met the same endpoint with a statistically significant 80% reduction. On the secondary endpoints, as compared to placebo, abaloparatide achieved a statistically significant fracture-rate reduction of 43% in the non-vertebral fracture subset of patients; a statistically significant reduction of 45% in the clinical fracture group; and a significant difference in the time to first incident of non-vertebral fracture in both the non-vertebral fracture and the clinical fracture subset of patients in this trial.

Table of Contents

In June 2015, we announced new data from our ACTIVE trial, as well as the top-line data from the first six months of ACTIVEExtend, the 24-month extension trial of the Phase 3 ACTIVE trial in which patients from the abaloparatide-SC and placebo groups of the ACTIVE trial received an approved alendronate therapy for osteoporosis management. The results from the ACTIVEExtend study showed that the group previously treated with abaloparatide had no new vertebral fractures during the first six months of receiving alendronate. From the start of the ACTIVE study, this group showed a statistically significant 87% reduction in new vertebral fractures, 52% reduction in non-vertebral fractures, 48% reduction in clinical fractures, and a 58% reduction in major osteoporotic fractures over the 25-month period, as compared to placebo. This group also achieved a 12.8% increase in bone mineral density, or BMD, at the lumbar spine, a 5.5% increase in BMD at total hip, and a 4.5% increase in BMD at the femoral neck. In addition, 20.4% of patients achieved a 6% increase or greater in BMD at all three sites.

A recent exploratory analysis of the ACTIVE trial showed that, for major osteoporotic fractures, there was a statistically significant 67% reduction in major osteoporotic fractures for the abaloparatide treatment group versus placebo, and a statistically significant 53% reduction in major osteoporotic fractures for the abaloparatide treatment group as compared to teriparatide.

In May 2015, we re-submitted our previously denied request for breakthrough therapy designation for abaloparatide-SC, including the 18-month top-line results of our ACTIVE trial. In July 2015, the U.S. Food and Drug Administration, or FDA, denied our request. We are evaluating our options for re-submission for breakthrough therapy designation based on the data from both our ACTIVE and ACTIVEExtend trials and/or to apply for one of the other FDA expedited review programs for new drugs that address unmet medical needs in the treatment of serious or life threatening conditions.

RAD1901

On July 15, 2015, we announced that early but promising preclinical data show that our investigational drug RAD1901, in combination with Pfizer's palbociclib, a CDK4/6 inhibitor, and Novartis' everolimus, an mTOR inhibitor, was effective in shrinking tumors. In patient-derived xenograft (PDX) breast cancer models with either wild type or mutant ESR1, treatment with RAD1901 resulted in marked tumor growth inhibition, and the combination of RAD1901 with either agent, palbociclib or everolimus, showed anti-tumor activity that was significantly greater than either agent alone.

The PDX model was established from a patient who had received multiple lines of breast cancer therapies (including chemotherapy and endocrine therapies) and her tumor expressed mutant ESR1, which is known to confer insensitivity to endocrine agents. In this endocrine insensitive PDX model, RAD1901 was associated with significant growth inhibition as a single agent. In addition, combining RAD1901 with palbociclib demonstrated marked anti-tumor activity that was significantly greater than RAD1901 alone in this ESR1 mutant PDX model. In MCF7 xenograft studies, RAD1901 single agent anti-tumor activity was also observed and showed significantly greater activity when combined with either palbociclib or everolimus. In these models all agents were orally dosed on a daily basis. The RAD1901 dose of 60 mg/kg achieves an exposure in these animals that is comparable to the clinical exposure currently being tested in the ongoing Phase 1 breast cancer study.

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. We have included our website address in this prospectus supplement solely as an inactive textual reference.

Table of Contents

The offering

Common stock offered by us	\$250,000,000 of shares
Common stock to be outstanding immediately after this offering	41,053,141 shares, which is based on an aggregate offering of \$250,000,000 of our common stock at an assumed public offering price of \$78.86 per share (the last reported sale price of our common stock on The NASDAQ Global Market on July 20, 2015), or 41,528,667 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 \$37,500,000 of additional shares of our common stock from us.
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-7 of this prospectus supplement.
Risk factors	See "Risk Factors" beginning on page S-4 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 37,882,967 shares of our common stock outstanding as of March 31, 2015, which does not include:

3,625,200 shares of common stock issuable upon exercise of stock options outstanding as of March 31, 2015, at a weighted average exercise price of \$17.48 per share;

574,517 shares of common stock reserved for issuance under our 2011 equity incentive plan as of March 31, 2015 and the additional 1,600,000 shares of common stock that were reserved for issuance under our 2011 equity incentive plan on May 7, 2015; and

848,616 shares of common stock issuable upon exercise of warrants outstanding as of March 31, 2015 at a weighted average exercise price of \$14.14 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.

Table of Contents

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 March 31, 2015, as updated by our subsequent filings under the Securities Exchange Act of 1934, as amended. 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, based on an assumed public offering price of \$78.86 per share, the last reported sale price of our common stock on The NASDAQ Global Market on July 20, 2015, if you purchase our common stock in this offering, you will incur immediate substantial dilution of approximately \$68.11 per share, representing the difference between the public offering price and our adjusted net tangible book value as of March 31, 2015, which gives effect to this offering. 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 8.6 million shares of our common stock as of March 31, 2015. These stockholders, acting together, 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;

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.

Table of Contents

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.

Table of Contents

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

Edgar Filing: Radius Health, Inc. - Form 424B5

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.

S-6

Table of Contents

Use of proceeds

We estimate that the net proceeds from the assumed sale of \$250,000,000 of shares of our common stock in this offering will be approximately \$234.5 million (or approximately \$269.7 million if the underwriters exercise in full their option to purchase \$37,500,000 of additional shares), after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

We intend to use the net proceeds we receive from this offering to further the development of RAD1901 for treatment of metastatic breast cancer in combination with other approved therapies and for the treatment of vasomotor symptoms in post-menopausal women, to fund the continued development of the optimized abaloparatide-TD patch and related manufacturing capabilities, to continue to build the commercial infrastructure, inventory and manufacturing capabilities for commercialization of abaloparatide-SC 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.

Table of Contents

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		
Third Quarter (through July 20, 2015)	\$ 84.64	\$ 65.76
Second Quarter	\$ 69.16	\$ 34.76
First Quarter	\$ 51.22	\$ 35.02
2014		
Fourth Quarter	\$ 42.57	\$ 16.55
Third Quarter	\$ 24.28	\$ 8.09
Second Quarter (from June 5, 2014)	\$ 14.60	\$ 7.46

On July 20, 2015, the last reported sale price of our common stock on The NASDAQ Global Market was \$78.86. As of July 17, 2015, there were 37,961,611 shares of our common stock outstanding held by approximately 63 holders of record.

Table of Contents

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.

S-9

Table of Contents

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 March 31, 2015, we had a net tangible book value of \$206.9 million, or \$5.46 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 March 31, 2015.

After giving further effect to the assumed sale by us of 3,170,174 shares of common stock in this offering, at an assumed public offering price of \$78.86 per share (the last reported sale price of our common stock on The NASDAQ Global Market on July 20, 2015), 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 March 31, 2015 would have been approximately \$441.4 million, or approximately \$10.75 per share. This amount represents an immediate increase in as adjusted net tangible book value of \$5.29 per share to our existing stockholders and an immediate dilution in as adjusted net tangible book value of approximately \$68.11 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	\$ 78.86
Net tangible book value per share as of March 31, 2015	\$ 5.46
Increase in as adjusted net tangible book value per share attributable to this offering	5.29
As adjusted net tangible book value per share after this offering	10.75
Dilution per share to new investors participating in this offering	\$ 68.11

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 March 31, 2015, after giving effect to this offering, would have been \$11.48 per share, and the dilution in as adjusted net tangible book value per share to investors in this offering would have been \$67.38 per share.

The above discussion and table are based on 37,882,967 shares of our common stock outstanding as of March 31, 2015, which does not include the following:

3,625,200 shares of common stock issuable upon exercise of stock options outstanding as of March 31, 2015, at a weighted average exercise price of \$17.48 per share;

574,517 shares of common stock reserved for issuance under our 2011 equity incentive plan as of March 31, 2015 and the additional 1,600,000 shares of common stock that were reserved for issuance under our 2011 equity incentive plan on May 7, 2015; and

848,616 shares of common stock issuable upon exercise of warrants outstanding as of March 31, 2015 at a weighted average exercise price of \$14.14 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 March 31, 2015, the as adjusted net tangible book value per share after this offering would be \$11.35 and total dilution per share to new investors would be \$67.51.

Table of Contents

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 \$78.86 per share would increase (decrease) our net tangible book value by \$3.0 million, the net tangible book value per share after this offering by \$0.07 and the dilution per share to new investors by \$0.93, 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 \$74.1 million, or \$1.51 per share, and would decrease the dilution per share to new investors in this offering by \$1.51 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 \$74.1 million, or \$1.58 per share, and would increase the dilution per share to new investors in this offering by \$1.58 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.

Table of Contents

Underwriting

We are offering the shares of common stock described in this prospectus supplement through a number of underwriters. J.P. Morgan Securities LLC, Merrill Lynch, Pierce, Fenner & Smith Incorporated and Deutsche Bank Securities Inc. are acting as representatives of the underwriters. We have entered into an underwriting agreement with the underwriters. Subject to the terms and conditions of the underwriting agreement, we have agreed to sell to the underwriters, and each underwriter has severally agreed to purchase, at the public offering price less the underwriting discounts and commissions set forth on the cover page of this prospectus supplement, the number of shares of common stock listed next to its name in the following table:

Name	Number of Shares
J.P. Morgan Securities LLC	
Merrill Lynch, Pierce, Fenner & Smith Incorporated	
Deutsche Bank Securities Inc.	
Cowen and Company, LLC	
Total	

The underwriters are committed to purchase all the common shares offered by us if they purchase any shares. The underwriting agreement also provides that if an underwriter defaults, the purchase commitments of non-defaulting underwriters may also be increased or the offering may be terminated.

The underwriters propose to offer the common shares directly to the public at the public offering price set forth on the cover page of this prospectus and to certain dealers at that price less a concession not in excess of \$ _____ per share. After the public offering of the shares, the offering price and other selling terms may be changed by the underwriters.

The underwriters have an option to buy up to an additional \$37,500,000 of shares of common stock from us to cover sales of shares by the underwriters which exceed the number of shares specified in the table above. The underwriters have 30 days from the date of this prospectus supplement to exercise this option. If any shares are purchased with this option, the underwriters will purchase shares in approximately the same proportion as shown in the table above. If any additional shares of common stock are purchased, the underwriters will offer the additional shares on the same terms as those on which the shares are being offered.

The underwriting fee is equal to the public offering price per share of common stock less the amount paid by the underwriters to us per share of common stock. The underwriting fee is \$ _____ per share. The following table shows the per share and total underwriting discounts and commissions to be paid to the underwriters assuming both no exercise and full exercise of the underwriters' option to purchase additional shares.

	Without option exercise	With full option exercise
Per Share	\$	\$
Total	\$	\$

We estimate that the total expenses of this offering, including registration, filing and listing fees, printing fees and legal and accounting expenses, but excluding the underwriting discounts and commissions, will be approximately \$525,000 and are payable by us. We have agreed to reimburse the underwriters for all expenses related to the clearance of the offering with the Financial Industry Regulatory Authority (in an amount not to exceed \$20,000).

Table of Contents

A prospectus supplement in electronic format may be made available on the web sites maintained by one or more underwriters, or selling group members, if any, participating in the offering. The underwriters may agree to allocate a number of shares to underwriters and selling group members for sale to their online brokerage account holders. Internet distributions will be allocated by the representatives to underwriters and selling group members that may make Internet distributions on the same basis as other allocations.

We and all of our officers have agreed with the underwriters that for a period of 90 days after the date of this prospectus supplement, and our directors, together with their affiliated entities, have agreed with the underwriters that for a period of 60 days after the date of this prospectus supplement, 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, except with the prior written consent of the representatives.

The restrictions described in the immediately preceding paragraph have certain exceptions, including, but not limited to, the following circumstances:

the establishment of a trading plan pursuant to Rule 10b5-1 under the Exchange Act, a "Rule 10b5-1 Plan," for the transfer of shares of common stock, provided that such plan does not provide for the transfer of common stock during the restricted period;

sales or transfers of common stock made pursuant to a Rule 10b5-1 Plan that was entered into by a single director prior to the date hereof, of up to approximately 25,000 shares; and

the issuance of common stock or other securities in connection with a transaction that includes a commercial relationship, any acquisition of assets or at least a controlling portion of the equity of another entity or the repayment, satisfaction, arrangement or borrowing pursuant to an existing or future credit facility or agreement, provided that the aggregate number of shares of common stock or securities issued may not exceed 5% of the total number of outstanding shares of common stock immediately following this offering, and the holder of such shares of common stock or securities must sign an agreement providing for transfer restrictions as set forth above.

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

In connection with this offering, the underwriters may engage in stabilizing transactions, which involves making bids for, purchasing and selling shares of common stock in the open market for the purpose of preventing or retarding a decline in the market price of the common stock while this offering is in progress. These stabilizing transactions may include making short sales of the common stock, which involves the sale by the underwriters of a greater number of shares of common stock than they are required to purchase in this offering, and purchasing shares of common stock on the open market to cover positions created by short sales. Short sales may be "covered" shorts, which are short positions in an amount not greater than the underwriters' option referred to above, or may be "naked" shorts, which are short positions in excess of that amount. The underwriters may close out any covered short position either by exercising their option, in whole or in part, or by purchasing shares in the open market. In making this determination, the underwriters will consider, among other things, the price of shares available for purchase in the open market compared to the price at which the underwriters may purchase shares through the option. 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 that could adversely affect investors who purchase in this offering. To the extent that the underwriters create a naked short position, they will purchase shares in the open market to cover the position.

The underwriters have advised us that, pursuant to Regulation M of the Securities Act of 1933, they may also engage in other activities that stabilize, maintain or otherwise affect the price of the

Table of Contents

common stock, including the imposition of penalty bids. This means that if the representatives of the underwriters purchase common stock in the open market in stabilizing transactions or to cover short sales, the representatives can require the underwriters that sold those shares as part of this offering to repay the underwriting discount received by them.

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.

These activities may have the effect of raising or maintaining the market price of the common stock or preventing or retarding a decline in the market price of the common stock, and, as a result, the price of the common stock may be higher than the price that otherwise might exist in the open market. If the underwriters commence these activities, they may discontinue them at any time. The underwriters may carry out these transactions on The NASDAQ Global Market, in the over-the-counter market or otherwise.

Selling Restrictions

General

Other than in the United States, no action has been taken by us or the underwriters that would permit a public offering of the securities offered by this prospectus supplement in any jurisdiction where action for that purpose is required. The securities offered by this prospectus supplement may not be offered or sold, directly or indirectly, nor may this prospectus supplement or any other offering material or advertisements in connection with the offer and sale of any such securities be distributed or published in any jurisdiction, except under circumstances that will result in compliance with the applicable rules and regulations of that jurisdiction. Persons into whose possession this prospectus supplement comes are advised to inform themselves about and to observe any restrictions relating to the offering and the distribution of this prospectus supplement. This prospectus supplement does not constitute an offer to sell or a solicitation of an offer to buy any securities offered by this prospectus supplement in any jurisdiction in which such an offer or a solicitation is unlawful.

European Economic Area

This document is only being distributed to and is only directed at (i) persons who are outside the United Kingdom or (ii) to investment professionals falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "Order") or (iii) high net worth entities, and other persons to whom it may lawfully be communicated, falling with Article 49(2)(a) to (d) of the Order (all such persons together being referred to as "relevant persons"). The securities are only available to, and any invitation, offer or agreement to subscribe, purchase or otherwise acquire such securities will be engaged in only with, relevant persons. Any person who is not a relevant person should not act or rely on this document or any of its contents.

In relation to each Member State of the European Economic Area which has implemented the Prospectus Directive (each, a "Relevant Member State"), from and including the date on which the European Union Prospectus Directive (the "EU Prospectus Directive") was implemented in that Relevant Member State (the "Relevant Implementation Date") an offer of securities described in this prospectus supplement may not be made 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

Table of Contents

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 EU Prospectus Directive, except that, with effect from and including the Relevant Implementation Date, an offer of securities described in this prospectus supplement may be made to the public in that Relevant Member State at any time:

to any legal entity which is a qualified investor as defined under the EU Prospectus Directive;

to fewer than 100 or, if the Relevant Member State has implemented the relevant provision of the 2010 PD Amending Directive, 150 natural or legal persons (other than qualified investors as defined in the EU Prospectus Directive); or

in any other circumstances falling within Article 3(2) of the EU Prospectus Directive, provided that no such offer of securities described in this prospectus supplement shall result in a requirement for the publication by us of a prospectus pursuant to Article 3 of the EU Prospectus Directive.

For the purposes of this provision, the expression an "offer of securities to the public" in relation to any securities 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 securities to be offered so as to enable an investor to decide to purchase or subscribe for the securities, as the same may be varied in that Member State by any measure implementing the EU Prospectus Directive in that Member State. The expression "EU Prospectus Directive" means Directive 2003/71/EC (and any amendments thereto, including the 2010 PD Amending Directive, to the extent implemented in the Relevant Member State) and includes any relevant implementing measure in each Relevant Member State, and the expression "2010 PD Amending Directive" means Directive 2010/73/EU.

Certain of the underwriters and their affiliates have provided in the past to us and our affiliates and may provide from time to time in the future certain commercial banking, financial advisory, investment banking and other services for us and such affiliates in the ordinary course of their business, for which they have received and may continue to receive customary fees and commissions. In addition, from time to time, certain of the underwriters and their affiliates may effect transactions for their own account or the account of customers, and hold on behalf of themselves or their customers, long or short positions in our debt or equity securities or loans, and may do so in the future.

United Kingdom

This document is only being distributed to and is only directed at (i) persons who are outside the United Kingdom or (ii) to investment professionals falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "Order") or (iii) high net worth entities, and other persons to whom it may lawfully be communicated, falling with Article 49(2)(a) to (d) of the Order (all such persons together being referred to as "relevant persons"). The securities are only available to, and any invitation, offer or agreement to subscribe, purchase or otherwise acquire such securities will be engaged in only with, relevant persons. Any person who is not a relevant person should not act or rely on this document or any of its contents.

Hong Kong

The securities have not been offered or sold and will not be offered or sold in Hong Kong, by means of any document, other than (a) to "professional investors" as defined in the Securities and Futures Ordinance (Cap. 571) of Hong Kong and any rules made under that Ordinance; or (b) in other circumstances which do not result in the document being a "prospectus" as defined in the Companies Ordinance (Cap. 32) of Hong Kong or which do not constitute an offer to the public within the meaning of that Ordinance. No advertisement, invitation or document relating to the securities has

Table of Contents

been or may be issued or has been or may be in the possession of any person for the purposes of issue, 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 of Hong Kong (except if permitted to do so under the securities laws of Hong Kong) other than with respect to securities which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" as defined in the Securities and Futures Ordinance and any rules made under that Ordinance.

Singapore

This prospectus supplement has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus supplement 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 (i) to an institutional investor under Section 274 of the Securities and Futures Act, Chapter 289 of Singapore (the "SFA"), (ii) to a relevant person pursuant to Section 275(1), or any person pursuant to Section 275(1A), and in accordance with the conditions specified in Section 275, of the SFA, or (iii) 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: (a) a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) 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 (b) a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor, securities (as defined in Section 239(1) of the SFA) of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the shares pursuant to an offer made under Section 275 of the SFA except: (1) to an institutional investor or to a relevant person defined in Section 275(2) of the SFA, or to any person arising from an offer referred to in Section 275(1A) or Section 276(4)(i)(B) of the SFA; (2) where no consideration is or will be given for the transfer; (3) where the transfer is by operation of law; (4) as specified in Section 276(7) of the SFA; or (5) as specified in Regulation 32 of the Securities and Futures (Offers of Investments) (Shares and Debentures) Regulations 2005 of Singapore.

Japan

The securities have not been and will not be registered under the Financial Instruments and Exchange Law of Japan (Law No. 25 of 1948, as amended) and, accordingly, will not be offered or sold, directly or indirectly, in Japan, or for the benefit of any Japanese Person or to others for re-offering or resale, directly or indirectly, in Japan or to any Japanese Person, except in compliance with all applicable laws, regulations and ministerial guidelines promulgated by relevant Japanese governmental or regulatory authorities in effect at the relevant time. For the purposes of this paragraph, "Japanese Person" shall mean any person resident in Japan, including any corporation or other entity organized under the laws of Japan.

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

Table of Contents

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, us, 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 supplement 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 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 supplement 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 supplement is appropriate to their needs, objectives and circumstances, and, if necessary, seek expert advice on those matters.

Table of Contents

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, 2014, and the effectiveness of Radius Health, Inc.'s internal control over financial reporting as of December 31, 2014 have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their reports thereon, incorporated by reference therein, and incorporated herein by reference. Such financial statements are incorporated herein by reference in reliance upon such reports given on the authority of such firm as experts in accounting and auditing.

S-18

Table of Contents

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, 2014, filed with the SEC on March 10, 2015.

Our Quarterly Report on Form 10-Q for the quarterly period ended March 31, 2015, filed with the SEC on May 6, 2015.

The information specifically incorporated by reference into our Annual Report on Form 10-K for the fiscal year ended December 31, 2014 from our Definitive Proxy Statement on Schedule 14A, filed with the SEC on March 25, 2015.

Our Current Reports on Form 8-K filed with the SEC on January 12, 2015, January 23, 2015, March 2, 2015, March 17, 2015, April 20, 2015, May 11, 2015, July 10, 2015, July 16, 2015 and July 21, 2015.

Edgar Filing: Radius Health, Inc. - Form 424B5

Table of Contents

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

S-20

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.

TABLE OF CONTENTS

ABOUT THIS PROSPECTUS	1
WHERE YOU CAN FIND MORE INFORMATION; INCORPORATION BY REFERENCE	2
THE COMPANY	4
RISK FACTORS	5
SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS	5
USE OF PROCEEDS	5
SELECTED FINANCIAL DATA	6
RATIO OF EARNINGS TO FIXED CHARGES AND PREFERRED SHARE DIVIDENDS	8
DESCRIPTION OF CAPITAL STOCK	9
DESCRIPTION OF OTHER SECURITIES	12
GLOBAL SECURITIES	13
SELLING SECURITYHOLDERS	16
PLAN OF DISTRIBUTION	17
LEGAL MATTERS	18
EXPERTS	18

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.

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

Edgar Filing: Radius Health, Inc. - Form 424B5

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.

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.

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.

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

Edgar Filing: Radius Health, Inc. - Form 424B5

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

Statement of Operations and Comprehensive Loss Data	Year Ended December 31,					Nine Months Ended September 30,	
	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)
Net (loss) earnings attributable to common stockholders							
	\$ (78,161)	\$ (83,120)	\$ 113	\$ (26,773)	\$ (26,494)	\$ (53,517)	\$ (60,857)
(Loss) earnings per share basic							
	\$ (203.91)	\$ (225.71)	\$ 0.51	\$ (190.20)	\$ (188.52)	\$ (4.23)	\$ (159.09)
(Loss) earnings per share diluted							
	\$ (203.91)	\$ (225.71)	\$ 0.06	\$ (190.20)	\$ (188.52)	\$ (4.23)	\$ (159.09)
Weighted average shares basic							
	383,310	368,261	219,254	140,764	140,537	12,651,628	382,541
Weighted average shares diluted							
	383,310	368,261	1,774,935	140,764	140,537	12,651,628	382,541

Balance Sheet Data	As of December 31,					September 30,	
	2013	2012	2011	2010	2009	2014	
	(in thousands)					(unaudited)	
Cash and cash equivalents	\$ 12,303	\$ 18,653	\$ 25,128	\$ 10,582	\$ 7,896	\$ 16,466	
Marketable securities		4,000	31,580	7,969	23,826	52,048	
Working capital	(22,675)	8,026	56,607	15,448	29,882	44,647	
Total assets	12,758	25,300	63,637	18,969	32,084	70,936	
Long-term liabilities	1,945	38,222	19,806			22,295	
Total liabilities	37,257	55,312	26,589	3,385	1,989	47,542	
	252,802	170,649	156,658	143,836	131,694		

Edgar Filing: Radius Health, Inc. - Form 424B5

Total convertible preferred stock and redeemable convertible preferred stock						
Total liabilities, convertible preferred stock, redeemable convertible preferred stock and stockholders' equity/deficit	12,758	25,300	63,637	18,969	32,084	70,936
	7					

RATIO OF EARNINGS TO FIXED CHARGES AND PREFERRED SHARE DIVIDENDS

The following table sets forth our historical ratios of earnings to fixed charges and preferred share dividends for the periods indicated.

	Year Ended December 31,					Nine Months Ended
	2009	2010	2011	2012	2013	September 30, 2014
Ratio of earnings (loss) to fixed charges(1)						
Ratio of earnings (loss) to combined fixed charges and preferred share dividends(2)						

- (1) Earnings were inadequate to cover fixed charges for the years ended December 31, 2009, 2010, 2011, 2012 and 2013 by \$15.1 million, \$14.6 million, \$42.5 million, \$69.1 million and \$60.7 million, respectively, and for the nine months ended September 30, 2014, by \$44.5 million.
- (2) Earnings were inadequate to cover fixed charges and preferred dividends for the years ended December 31, 2009, 2010, 2011, 2012 and 2013 by \$15.1 million, \$14.6 million, \$53.4 million, \$83.1 million and \$101.3 million, respectively, and for the nine months ended September 30, 2014, by \$63.6 million.

For these ratios, "earnings" is computed by adding pre-tax income (loss) from continuing operations, interest expense, rental expense and amortization of capitalized interest. Fixed charges consist of interest expense, capitalized interest, rental expense, and dividends on preferred stock.

DESCRIPTION OF CAPITAL STOCK

Our authorized capital stock consists of 200,000,000 shares of common stock, par value \$.0001 per share, and 10,000,000 shares of preferred stock, par value \$.0001 per share. The following description of our capital stock and provisions of our restated certificate of incorporation and amended and restated bylaws are summaries and are qualified by reference to our restated certificate of incorporation and amended and restated bylaws. We have filed copies of these documents with the SEC as exhibits to our registration statement of which this prospectus forms a part.

Common Stock

Each holder of our common stock is entitled to one vote for each share held on all matters submitted to a vote of stockholders. Our stockholders do not have cumulative voting rights. Accordingly, the holders of a majority of the voting shares are able to elect all of the directors. Subject to preferential dividend rights of any series of preferred stock that we may designate and issue in the future, holders of our common stock are entitled to receive dividends, if any, as may be declared from time to time by our board of directors out of legally available funds. In the event of our liquidation or dissolution, holders of our common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities and the satisfaction of any liquidation preference granted to the holders of any then outstanding shares of preferred stock. Holders of our common stock have no preemptive, conversion or subscription rights, and there are no redemption or sinking fund provisions applicable to our common stock. The rights, preferences and privileges of the holders of our common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future.

Preferred Stock

Our board of directors has the authority, without further action by our stockholders, to issue shares of preferred stock in one or more series and to fix the rights, preferences, privileges and restrictions thereof. These rights, preferences and privileges could include dividend rights, conversion rights, voting rights, terms of redemption, liquidation preferences, sinking fund terms and the number of shares constituting any series or the designation of such series, any or all of which may be greater than the rights of common stock. The issuance of our preferred stock could adversely affect the voting power of holders of common stock and the likelihood that such holders will receive dividend payments and payments upon liquidation. In addition, the issuance of preferred stock could have the effect of delaying, deferring or preventing a change of control of our company or other corporate action. No shares of preferred stock are currently outstanding, and we have no present plan to issue any shares of preferred stock. We will set forth in the applicable prospectus supplement a description of any series of preferred stock approved by our board of directors that may be offered and sold pursuant to this prospectus.

Anti-Takeover Provisions

Our restated certificate of incorporation provides for our board of directors to be divided into three classes, with staggered three-year terms. Only one class of directors will be elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. Because our stockholders do not have cumulative voting rights, our stockholders holding a majority of the shares of common stock outstanding will be able to elect all of our directors. Our restated certificate of incorporation and amended and restated bylaws provide that all stockholder action must be effected at a duly called meeting of stockholders and not by a consent in writing, and that only our board of directors, chairman of the board, chief executive officer or president (in the absence of a chief executive officer) may call a special meeting of stockholders.

Our restated certificate of incorporation requires a two-thirds stockholder vote for the amendment, repeal or modification of certain provisions of our restated certificate of incorporation and amended and restated bylaws relating to the classification of our board of directors, the requirement that stockholder actions be effected at a duly called meeting, and the designated parties entitled to call a special meeting of the stockholders. The combination of the classification of our board of directors, the lack of cumulative voting and the two-thirds stockholder voting requirements make it more difficult for our existing stockholders to replace our board of directors as well as for another party to obtain control of us by replacing our board of directors. Because our board of directors has the power to retain and discharge our officers, these provisions could also make it more difficult for existing stockholders or another party to effect a change in management. In addition, the authorization of undesignated preferred stock makes it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to change our control.

Our restated certificate of incorporation provides that, unless we consent in writing to the selection of an alternative form, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for: (1) any derivative action or proceeding brought on our behalf; (2) any action asserting a claim of breach of a fiduciary duty or other wrongdoing by any of our directors, officers, employees or agents to us or our stockholders, creditors or other of constituents; (3) any action asserting a claim against us arising pursuant to any provision of the General Corporation Law of the State of Delaware or our certificate of incorporation or bylaws; (4) any action to interpret, apply, enforce or determine the validity of our certificate of incorporation or bylaws; or (5) any action asserting a claim governed by the internal affairs doctrine. Our restated certificate of incorporation also provides that any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock will be deemed to have notice of and to have consented to this choice of forum provision. It is possible that a court of law could rule that the choice of forum provision contained in our restated certificate of incorporation is inapplicable or unenforceable if it is challenged in a proceeding or otherwise.

These provisions may have the effect of deterring hostile takeovers or delaying changes in our control or management. These provisions are intended to enhance the likelihood of continued stability in the composition of our board of directors and its policies and to discourage certain types of transactions that may involve an actual or threatened acquisition of us. These provisions are designed to reduce our vulnerability to an unsolicited acquisition proposal. The provisions also are intended to discourage certain tactics that may be used in proxy fights. However, such provisions could have the effect of discouraging others from making tender offers for our shares and, as a consequence, they also may inhibit fluctuations in the market price of our shares that could result from actual or rumored takeover attempts. These provisions may also have the effect of preventing changes in our management.

Section 203 of the Delaware General Corporation Law

We are subject to Section 203 of the Delaware General Corporation Law, which prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years after the date that such stockholder became an interested stockholder, with the following exceptions:

if, before such date, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested holder;

if, upon completion of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction began, excluding for purposes of determining the voting stock outstanding (but not the outstanding voting stock owned by the interested stockholder) those shares owned (i) by persons who are directors and also officers and (ii) employee stock plans in which employee participants do not have the right to determine

Edgar Filing: Radius Health, Inc. - Form 424B5

confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or

if, on or after such date, the business combination is approved by the board of directors and authorized at an annual or special meeting of the stockholders, and not by written consent, by the affirmative vote of at least two-thirds of the outstanding voting stock that is not owned by the interested stockholder.

In general, Section 203 defines business combination to include the following:

any merger or consolidation involving the corporation and the interested stockholder;

any sale, transfer, pledge or other disposition of 10% or more of the assets of the corporation involving the interested stockholder;

subject to certain exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;

any transaction involving the corporation that has the effect of increasing the proportionate share of the stock or any class or series of the corporation beneficially owned by the interested stockholder; or

the receipt by the interested stockholder of the benefit of any loss, advances, guarantees, pledges or other financial benefits by or through the corporation.

In general, Section 203 defines an "interested stockholder" as an entity or person who, together with the person's affiliates and associates, beneficially owns, or is an affiliate or associate of the corporation and within three years prior to the time of determination of interested stockholder status did own, 15% or more of the outstanding voting stock of the corporation.

DESCRIPTION OF OTHER SECURITIES

We will set forth in the applicable prospectus supplement a description of any warrants or units issued by us that may be offered and sold pursuant to this prospectus.

GLOBAL SECURITIES

Book-Entry, Delivery and Form

Unless we indicate differently in a prospectus supplement, the securities initially will be issued in book-entry form and represented by one or more global securities. The global securities will be deposited with, or on behalf of, The Depository Trust Company, New York, New York, as depositary, or DTC, and registered in the name of Cede & Co., the nominee of DTC. Unless and until it is exchanged for individual certificates evidencing securities under the limited circumstances described below, a global security may not be transferred except as a whole by the depositary to its nominee or by the nominee to the depositary, or by the depositary or its nominee to a successor depositary or to a nominee of the successor depositary.

DTC has advised us that it is:

- a limited-purpose trust company organized under the New York Banking Law;
- a "banking organization" within the meaning of the New York Banking Law;
- a member of the Federal Reserve System;
- a "clearing corporation" within the meaning of the New York Uniform Commercial Code; and
- a "clearing agency" registered pursuant to the provisions of Section 17A of the Exchange Act.

DTC holds securities that its participants deposit with DTC. DTC also facilitates the settlement among its participants of securities transactions, such as transfers and pledges, in deposited securities through electronic computerized book-entry changes in participants' accounts, thereby eliminating the need for physical movement of securities certificates. "Direct participants" in DTC include securities brokers and dealers, including underwriters, banks, trust companies, clearing corporations and other organizations. DTC is a wholly-owned subsidiary of The Depository Trust & Clearing Corporation, or DTCC. DTCC is the holding company for DTC, National Securities Clearing Corporation and Fixed Income Clearing Corporation, all of which are registered clearing agencies. DTCC is owned by the users of its regulated subsidiaries. Access to the DTC system is also available to others, which we sometimes refer to as indirect participants, that clear through or maintain a custodial relationship with a direct participant, either directly or indirectly. The rules applicable to DTC and its participants are on file with the SEC.

Purchases of securities under the DTC system must be made by or through direct participants, which will receive a credit for the securities on DTC's records. The ownership interest of the actual purchaser of a security, which we sometimes refer to as a beneficial owner, is in turn recorded on the direct and indirect participants' records. Beneficial owners of securities will not receive written confirmation from DTC of their purchases. However, beneficial owners are expected to receive written confirmations providing details of their transactions, as well as periodic statements of their holdings, from the direct or indirect participants through which they purchased securities. Transfers of ownership interests in global securities are to be accomplished by entries made on the books of participants acting on behalf of beneficial owners. Beneficial owners will not receive certificates representing their ownership interests in the global securities, except under the limited circumstances described below.

To facilitate subsequent transfers, all global securities deposited by direct participants with DTC will be registered in the name of DTC's partnership nominee, Cede & Co., or such other name as may be requested by an authorized representative of DTC. The deposit of securities with DTC and their registration in the name of Cede & Co. or such other nominee will not change the beneficial ownership of the securities. DTC has no knowledge of the actual beneficial owners of the securities. DTC's records reflect only the identity of the direct participants to whose accounts the securities are credited,

Edgar Filing: Radius Health, Inc. - Form 424B5

which may or may not be the beneficial owners. The participants are responsible for keeping account of their holdings on behalf of their customers.

So long as the securities are in book-entry form, you will receive payments and may transfer securities only through the facilities of the depositary and its direct and indirect participants. We will maintain an office or agency in the location specified in the prospectus supplement for the applicable securities, where notices and demands in respect of the securities and the indenture may be delivered to us and where certificated securities may be surrendered for payment, registration of transfer or exchange.

Conveyance of notices and other communications by DTC to direct participants, by direct participants to indirect participants and by direct participants and indirect participants to beneficial owners will be governed by arrangements among them, subject to any legal requirements in effect from time to time.

Redemption notices will be sent to DTC. If less than all of the securities of a particular series are being redeemed, DTC's practice is to determine by lot the amount of the interest of each direct participant in the securities of such series to be redeemed.

Neither DTC nor Cede & Co. (or such other DTC nominee) will consent or vote with respect to the securities. Under its usual procedures, DTC will mail an omnibus proxy to us as soon as possible after the record date. The omnibus proxy assigns the consenting or voting rights of Cede & Co. to those direct participants to whose accounts the securities of such series are credited on the record date, identified in a listing attached to the omnibus proxy.

So long as securities are in book-entry form, we will make payments on those securities to the depositary or its nominee, as the registered owner of such securities, by wire transfer of immediately available funds. If securities are issued in definitive certificated form under the limited circumstances described below, we will have the option of making payments by check mailed to the addresses of the persons entitled to payment or by wire transfer to bank accounts in the United States designated in writing to the applicable trustee or other designated party at least 15 days before the applicable payment date by the persons entitled to payment, unless a shorter period is satisfactory to the applicable trustee or other designated party.

Redemption proceeds, distributions and dividend payments on the securities will be made to Cede & Co., or such other nominee as may be requested by an authorized representative of DTC. DTC's practice is to credit direct participants' accounts upon DTC's receipt of funds and corresponding detail information from us on the payment date in accordance with their respective holdings shown on DTC records. Payments by participants to beneficial owners will be governed by standing instructions and customary practices, as is the case with securities held for the account of customers in bearer form or registered in "street name." Those payments will be the responsibility of participants and not of DTC or us, subject to any statutory or regulatory requirements in effect from time to time. Payment of redemption proceeds, distributions and dividend payments to Cede & Co., or such other nominee as may be requested by an authorized representative of DTC, is our responsibility, disbursement of payments to direct participants is the responsibility of DTC, and disbursement of payments to the beneficial owners is the responsibility of direct and indirect participants.

Except under the limited circumstances described below, purchasers of securities will not be entitled to have securities registered in their names and will not receive physical delivery of securities. Accordingly, each beneficial owner must rely on the procedures of DTC and its participants to exercise any rights under the securities and the indenture.

The laws of some jurisdictions may require that some purchasers of securities take physical delivery of securities in definitive form. Those laws may impair the ability to transfer or pledge beneficial interests in securities.

Edgar Filing: Radius Health, Inc. - Form 424B5

DTC may discontinue providing its services as securities depository with respect to the securities at any time by giving reasonable notice to us. Under such circumstances, in the event that a successor depository is not obtained, securities certificates are required to be printed and delivered.

As noted above, beneficial owners of a particular series of securities generally will not receive certificates representing their ownership interests in those securities. However, if:

DTC notifies us that it is unwilling or unable to continue as a depository for the global security or securities representing such series of securities or if DTC ceases to be a clearing agency registered under the Exchange Act at a time when it is required to be registered and a successor depository is not appointed within 90 days of the notification to us or of our becoming aware of DTC's ceasing to be so registered, as the case may be;

we determine, in our sole discretion, not to have such securities represented by one or more global securities; or

an Event of Default has occurred and is continuing with respect to such series of securities,

we will prepare and deliver certificates for such securities in exchange for beneficial interests in the global securities. Any beneficial interest in a global security that is exchangeable under the circumstances described in the preceding sentence will be exchangeable for securities in definitive certificated form registered in the names that the depository directs. It is expected that these directions will be based upon directions received by the depository from its participants with respect to ownership of beneficial interests in the global securities.

We have obtained the information in this section and elsewhere in this prospectus concerning DTC and DTC's book-entry system from sources that are believed to be reliable, but we take no responsibility for the accuracy of this information.

SELLING SECURITYHOLDERS

Information about selling securityholders, where applicable, will be set forth in a prospectus supplement, in a post-effective amendment or in filings we make with the SEC under the Exchange Act that are incorporated by reference.

PLAN OF DISTRIBUTION

We or any of the selling securityholders may sell the offered securities from time to time:

through underwriters or dealers;

through agents;

directly to one or more purchasers; or

through a combination of any of these methods of sale.

We will identify the specific plan of distribution, including any underwriters, dealers, agents or direct purchasers and their compensation in the applicable prospectus supplement.

LEGAL MATTERS

Latham & Watkins LLP will pass upon certain legal matters relating to the issuance and sale of the securities offered hereby on behalf of Radius Health, Inc. Additional legal matters may be passed upon for us, the selling securityholders or any underwriters, dealers or agents, by counsel that we will name in the applicable prospectus supplement.

EXPERTS

The financial statements of Radius Health, Inc. included 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 incorporated herein by reference in reliance upon such report given on the authority of such firm as experts in accounting and auditing.