

INFINITY PHARMACEUTICALS, INC.

Form 424B3

April 09, 2013

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The information in this preliminary prospectus supplement is not complete and may be changed. A registration statement relating to these securities has been declared effective by the Securities and Exchange Commission. This preliminary prospectus supplement and the accompanying prospectus are not an offer to sell these securities, and no offer to buy these securities is being solicited, in any jurisdiction where the offer or sale is not permitted.

**Filed Pursuant to Rule 424(b)(3)
Registration File No. 333-184184**

(Subject to completion, dated April 9, 2013)

Prospectus Supplement

(To Prospectus dated October 19, 2012)

8,500,000 Shares of Common Stock

This prospectus relates to resales of shares of common stock, par value \$0.001 per share, held by Beacon Company and Rosebay Medical Company L.P. (which we collectively refer to in this prospectus supplement as the selling stockholders). We will not receive any proceeds from the sale of the shares. You should read this prospectus supplement and any applicable prospectus before you invest.

Our common stock is listed on the NASDAQ Global Select Market under the symbol INFI . On April 8, 2013, the last reported sale price was \$47.50 per share.

Investing in our common stock involves risks that are described in the Risk Factors section beginning on page S-6 of this prospectus supplement and the risk factors described in the other documents incorporated by reference herein.

The Securities and Exchange Commission and state securities regulators have not approved or disapproved of these securities or determined if this prospectus supplement or the accompanying prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

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| | Per Share | Total |
|--|----------------------|--------------|
| Public offering price | \$ | \$ |
| Underwriting discounts and commissions | \$ | \$ |
| Proceeds, before expenses, to selling stockholders | \$ | \$ |

The selling stockholders have granted the underwriters an option for a period of up to 30 days from the date of this prospectus supplement to purchase up to 1,275,000 additional shares of common stock at the public offering price less the underwriting discounts and commissions to cover over-allotments, if any. If the underwriters exercise this right in full, the total underwriting discounts and commissions payable by the selling stockholders will be \$, and the total proceeds to the selling stockholders, before expenses, will be \$.

We estimate the expenses of this offering payable by us, which exclude underwriting discounts and commissions and certain other offering expenses to be paid by the selling stockholders, will be approximately \$175,000.

The underwriters expect to deliver the shares of common stock to purchasers on or about April , 2013, subject to the satisfaction of certain conditions.

Joint Book-Running Managers

Morgan Stanley

The date of this prospectus supplement is April , 2013

J.P. Morgan

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ABOUT THIS PROSPECTUS SUPPLEMENT

On September 28, 2012, we filed with the Securities and Exchange Commission, or SEC, a registration statement on Form S-3 (File No. 333-184184) utilizing a shelf registration process relating to the securities described in this prospectus supplement, which was declared effective by the SEC on October 19, 2012. Under this shelf registration process, the selling stockholders named in a prospectus supplement may, from time to time, offer and sell our common stock in one or more offerings or resales.

This document is in two parts. The first part is this prospectus supplement, which describes the specific terms of this common stock offering and also adds to and updates information contained in the accompanying prospectus and the documents incorporated by reference herein or therein. The second part, the accompanying prospectus, provides more general information. Generally, when we refer to this prospectus, we are referring to both parts of this document combined. To the extent there is a conflict between the information contained in this prospectus supplement and the information contained in the accompanying prospectus or any document incorporated by reference herein or therein filed prior to the date of this prospectus supplement, you should rely on the information in this prospectus supplement; provided that if any statement in one of these documents is inconsistent with a statement in another document having a later date for example, a document incorporated by reference in the accompanying prospectus the statement in the document having the later date modifies or supersedes the earlier statement.

We further note that the representations, warranties and covenants made by us in any agreement that is filed as an exhibit to any document that is incorporated by reference herein or in the accompanying prospectus were made solely for the benefit of the parties to such agreement, including, in some cases, for the purpose of allocating risk among the parties to such agreement, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were accurate only as of the date when made. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

You should rely only on the information contained in this prospectus supplement or the accompanying prospectus, or incorporated by reference herein or therein. We have not authorized, and the underwriters have not authorized, anyone to provide you with information that is different. The information contained in this prospectus supplement and the accompanying prospectus, and incorporated by reference herein or therein, is accurate only as of the respective dates hereof or thereof, regardless of the time of delivery of this prospectus supplement and the accompanying prospectus or of any sale of our common stock. It is important for you to read and consider all information contained in this prospectus supplement and the accompanying prospectus, including the documents incorporated by reference herein and therein, in making your investment decision. You should also read and consider the information in the documents to which we have referred you in the sections entitled "Where You Can Find More Information" and "Incorporation of Certain Information by Reference" in this prospectus supplement and in the sections entitled "Where You Can Find More Information" and "Incorporation of Certain Documents by Reference" in the accompanying prospectus.

The selling stockholders 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 accompanying prospectus and the offering of the common stock in certain jurisdictions may be restricted by law. Persons outside the United States who come into possession of this prospectus supplement and the accompanying prospectus must inform themselves about, and observe any restrictions relating to, the offering of the common stock and the distribution of this prospectus supplement and the accompanying prospectus outside the United States. This prospectus supplement and the accompanying prospectus do 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 and the accompanying prospectus by any person in any jurisdiction in which it is unlawful for such person to make such an offer or solicitation.

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Unless otherwise stated, all references in this prospectus supplement and the accompanying prospectus to we, us, our, Infinity, the Company similar designations refer to Infinity Pharmaceuticals, Inc. and its subsidiary. The Infinity logo and all other Infinity product names are trademarks of Infinity or its subsidiary in the United States and in other select countries. We may indicate U.S. trademark registrations and U.S. trademarks with the symbols ® and ™, respectively. Other third-party logos and product/trade names are registered trademarks or trade names of their respective owners.

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SUMMARY

This summary highlights information contained elsewhere in this prospectus supplement and the accompanying prospectus and in the documents we incorporate by reference herein and therein. This summary does not contain all of the information that you should consider before deciding to invest in our common stock. You should read this entire prospectus supplement and the accompanying prospectus carefully, including the Risk Factors section contained in this prospectus supplement and our consolidated financial statements and the related notes and the other documents incorporated by reference herein or therein.

INFINITY PHARMACEUTICALS, INC.

Our Business

We are an innovative drug discovery and development company seeking to discover, develop and deliver to patients best-in-class medicines designed to address diseases with significant unmet need. We combine proven scientific expertise with a passion for developing novel small molecule drugs that target emerging disease pathways. Our programs focused on the inhibition of phosphoinositide-3-kinase and heat shock protein 90 are evidence of our innovative approach to drug discovery and development. We have worldwide development and commercialization rights to all of our development candidates and early discovery programs, subject to certain financial obligations to our current licensor and former development partners.

IPI-145, our lead product candidate, is a potent, oral inhibitor of Class I PI3K-delta and PI3K-gamma, which we are investigating in both hematologic malignancies and inflammatory diseases. We believe that IPI-145 is the first PI3K-delta,gamma inhibitor in clinical development. The following is a summary of the clinical development of IPI-145 to date:

Hematologic Malignancies

We are conducting a Phase 1, open-label, dose-escalation study designed to evaluate the safety, pharmacokinetics and clinical activity of IPI-145 in patients with advanced hematologic malignancies.

We are enrolling patients in five additional cohort expansions in the Phase 1 study to further evaluate the safety, pharmacokinetics and activity of IPI-145 in patients with the following hematologic malignancies:

Chronic lymphocytic leukemia, indolent non-Hodgkin lymphoma and mantle cell lymphoma

T-cell lymphomas

Aggressive B-cell lymphomas

Myeloid neoplasms

T-cell or B-cell acute lymphoblastic leukemia/lymphoma

We are planning to initiate at least two additional trials of IPI-145 in patients with hematologic malignancies in 2013.

Inflammation

We have completed a Phase 1, randomized, double-blind, placebo-controlled trial of IPI-145 in healthy adult subjects designed to support the development of IPI-145 in inflammatory diseases.

We are conducting a Phase 2a randomized, double-blind, placebo-controlled trial of IPI-145 in patients with mild, allergic asthma.

We are planning to initiate in the first half of 2013 a Phase 2, randomized, placebo-controlled study to evaluate the safety and activity of multiple doses of IPI-145 in patients with rheumatoid arthritis.

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In January 2013, we announced our second potent, oral PI3K-delta,gamma inhibitor, IPI-443. We expect to complete in the second half of 2013 nonclinical studies designed to enable the initiation of Phase 1 clinical development.

Our second clinical candidate, retaspimycin hydrochloride (HCl), is a novel, potent and selective inhibitor of heat shock protein 90 (Hsp90). We completed patient enrollment in a Phase 2, randomized, double-blind, placebo-controlled clinical trial evaluating retaspimycin HCl in combination with docetaxel, a chemotherapy, compared to placebo and docetaxel in 226 patients with second or third-line non-small cell lung cancer (NSCLC), who are naive to docetaxel treatment and have a history of heavy smoking. We stratified patients in our Phase 2 trial by squamous cell carcinoma and adenocarcinoma based on results from our Phase 1b trial in which we observed partial responses in patients with squamous cell carcinoma. In addition, we are prospectively evaluating a novel biomarker that we believe may be predictive of response. We expect to report topline overall survival data from this trial in the first half of 2013.

We are also enrolling patients in a Phase 1b/2 trial to explore the safety and efficacy of retaspimycin HCl in combination with everolimus, an inhibitor of the mammalian target of rapamycin (mTOR), pathway, in NSCLC patients with a KRAS gene mutation. The objective of this Phase 1b/2 trial is to determine the recommended dose for the combination treatment and to evaluate the safety and clinical activity of retaspimycin HCl in combination with everolimus. We expect to provide an update from this Phase 1b/2 trial in the first half of 2013.

In addition to our clinical stage programs, we have multiple innovative projects in earlier stages of development. Through our internal discovery efforts, we also discovered IPI-940, a novel, orally available inhibitor of FAAH. It is believed that inhibition of FAAH may enable the body to bolster its own analgesic and anti-inflammatory response, and may have applicability in a broad range of painful or inflammatory conditions. We are currently seeking potential partnering opportunities for our FAAH program. In June 2012, we voluntarily stopped all company-sponsored clinical trials of saridegib, our lead Hedgehog pathway inhibitor.

Company Information

We were incorporated in California on March 22, 1995, under the name IRORI and, in 1998, we changed our name to Discovery Partners International, Inc., or DPI. In July 2000, we reincorporated in Delaware. On September 12, 2006, DPI completed a merger with Infinity Pharmaceuticals, Inc., or IPI, pursuant to which a wholly-owned subsidiary of DPI merged with and into IPI. IPI was the surviving corporation in the merger, changed its name to Infinity Discovery, Inc. and became a wholly owned subsidiary of DPI. In addition, we changed our corporate name from Discovery Partners International, Inc. to Infinity Pharmaceuticals, Inc., and our ticker symbol on the NASDAQ Global Market to INFI . Our common stock currently trades on the NASDAQ Global Select Market.

Our principal executive offices are located at 780 Memorial Drive, Cambridge, Massachusetts 02139 and our telephone number at that address is (617) 453-1000. Our website is located at www.infi.com. We regularly use our website to post information regarding our business, product development programs and governance, and we encourage you to use our website, particularly the section entitled Investors/Media, as a source of information about us. We have not incorporated by reference into this prospectus supplement the information on our website and you should not consider it to be a part of this prospectus supplement. Our website address is included as an inactive textual reference only.

As of March 31, 2013, there were 71 holders of record of our common stock.

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Agreement between Infinity and Selling Stockholders

On April 9, 2013, we entered into a letter agreement with the selling stockholders and Purdue Pharma L.P., or PPLP, pursuant to which the parties have agreed that effective upon the public announcement of the offering described herein and contingent upon the sale of shares by the selling stockholders in the offering: (i) we have waived the existing lock-up restrictions set forth in the securities purchase agreement we entered into with the selling stockholders and PPLP on July 17, 2012, which we refer to herein as the 2012 Purchase Agreement, but only with respect to the shares of our common stock sold by the selling stockholders in this offering; (ii) with respect to any shares that are held by the selling stockholders and PPLP after this offering, which we refer to as the remaining shares, the selling stockholders and PPLP have agreed that with respect to such remaining shares they will not exercise, in connection with our next offering of capital stock, certain piggyback registration rights that we granted to them pursuant to the 2012 Purchase Agreement; and (iii) any such remaining shares will be subject to a lock-up between us and the selling stockholders and PPLP through the six-month anniversary of the execution of the underwriting agreement in connection with the offering described herein and the selling stockholders and PPLP agree, if so requested, pursuant to the 2012 Purchase Agreement to execute a lock-up agreement with the underwriters, placement agents or other initial purchasers in any offering of our capital stock that commences on or before December 31, 2013. For a further discussion of the 2012 Purchase Agreement, please see the section entitled Selling Stockholders in the accompanying prospectus.

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THE OFFERING

| | |
|--|---|
| Common stock offered by the selling stockholders | 8,500,000 shares |
| Common stock to be outstanding after this offering | 47,828,899 shares |
| Selling stockholders | Beacon Company and Rosebay Medical Company L.P. For more information, see the section of this prospectus supplement entitled Selling Stockholders. |
| Common stock to be beneficially owned by the selling stockholders after the offering | 2,916,565 shares (assuming that the underwriters do not exercise the over-allotment option). |
| Use of proceeds | We will not receive any proceeds from the sale of any shares of our common stock offered by the selling stockholders. |
| Risk factors | See Risk Factors beginning on page S-5 of this prospectus supplement and in our Annual Report on Form 10-K filed with the SEC on March 5, 2013, which is incorporated herein by reference, for a discussion of factors you should carefully consider before deciding to invest in our common stock. |
| Over-allotment option | The selling stockholders have granted the underwriters an option for a period of up to 30 days from the date of this prospectus supplement to purchase up to 1,275,000 additional shares of common stock at the public offering price, less the underwriting discounts and commissions, to cover over-allotments, if any. |
| NASDAQ Global Select Market symbol | INFI |
| The number of shares of our common stock to be outstanding after this offering is based on 47,828,899 shares outstanding as of March 31, 2013, and excludes as of such date: | |

6,241,841 shares of common stock issuable upon the exercise of outstanding stock options at a weighted-average exercise price of \$9.51 per share; and

an aggregate of 2,620,696 additional shares of common stock reserved for future issuance under our 2010 stock incentive plan. Unless we specifically state otherwise, all information in this prospectus supplement:

assumes that the underwriters do not exercise their over-allotment option; and

assumes no exercise of outstanding options or warrants.

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Table of Contents**SUMMARY CONSOLIDATED FINANCIAL DATA**

You should read the following summary consolidated financial data together with our financial statements and related notes and the Management's Discussion and Analysis of Financial Condition and Results of Operations sections of our periodic reports incorporated by reference in this prospectus supplement. We derived the summary statements of operations and comprehensive income (loss) data for the years ended December 31, 2012, 2011 and 2010 from our audited financial statements incorporated by reference in this prospectus supplement. Our historical results for any prior period are not necessarily indicative of results to be expected in any future period, and our results for any interim period are not necessarily indicative of results for a full fiscal year.

| | 2012 | Years Ended December 31, 2011 | 2010 |
|--|-------------|----------------------------------|-------------|
| Statement of operations and comprehensive income (loss) data: | | | |
| (in thousands, except share and per share data) | | | |
| Collaborative research and development revenue from Purdue entities | \$ 47,114 | \$ 92,773 | \$ 71,331 |
| Operating expenses: | | | |
| Research and development | 118,595 | 108,582 | 99,232 |
| General and administrative | 27,882 | 22,719 | 21,070 |
| Total operating expenses | 146,477 | 131,301 | 120,302 |
| Gain on termination of Purdue entities alliance | 46,555 | | |
| Loss from operations | (52,808) | (38,528) | (48,971) |
| Other income (expense): | | | |
| Interest expense | (1,908) | (1,841) | (1,910) |
| Income from Massachusetts tax incentive award | 193 | | |
| Income from Therapeutic Discovery Grants | | | 734 |
| Interest and investment income | 559 | 327 | 463 |
| Total other expense | (1,156) | (1,514) | (713) |
| Loss before income taxes | (53,964) | (40,042) | (49,684) |
| Income tax benefit | | | 700 |
| Net loss | \$ (53,964) | \$ (40,042) | \$ (48,984) |
| Basic and diluted loss per common share | \$ (1.70) | \$ (1.50) | \$ (1.86) |
| Basic and diluted weighted average number of common shares outstanding | 31,711,264 | 26,620,278 | 26,321,398 |
| Other comprehensive income (loss): | | | |
| Net unrealized holding gains (losses) on available-for-sale securities arising during the period | \$ 112 | \$ (32) | \$ 17 |
| Comprehensive loss | \$ (53,852) | \$ (40,074) | \$ (48,967) |

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RISK FACTORS

Investing in our common stock involves significant risks. In addition to information included or incorporated by reference in this prospectus supplement and the accompanying prospectus, you should carefully consider the risks described in our Annual Report on Form 10-K filed with the SEC on March 5, 2013, which is incorporated by reference herein, before making an investment decision. We caution you that the risks and uncertainties we have described, among others, could cause our actual results to differ materially from those expressed in forward-looking statements made by us or on our behalf in filings with the SEC, press releases, communications with investors and oral statements. Actual future results may differ materially from those anticipated in forward-looking statements. We undertake no obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise. You are advised, however, to consult any further disclosure we make in our reports filed with the SEC.

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus supplement, the accompanying prospectus and the documents incorporated by reference herein and therein contain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. Such forward-looking statements include statements about our future discovery and development efforts, our collaborations, our future operating results and financial position, our business strategy, and other objectives for future operations. You can identify these forward-looking statements by their use of words such as anticipate, believe, estimate, expect, forecast, intend, plan, project, target, will and other words and terms of similar meaning. You also can identify them by the fact that they do not relate strictly to historical or current facts. There are a number of important risks and uncertainties that could cause our actual results to differ materially from those indicated by forward-looking statements, including the factors referred to under the caption "Risk Factors" in this prospectus supplement and those described in our Annual Report on Form 10-K filed with the SEC on March 5, 2013. These important factors include the factors that we identify in the documents we incorporate by reference in this prospectus supplement and the accompanying prospectus. You should read these factors and the other cautionary statements made in this prospectus supplement, the accompanying prospectus and in the documents we incorporate by reference herein and therein as being applicable to all related forward-looking statements wherever they appear in this prospectus supplement, the accompanying prospectus or in the documents incorporated by reference.

You should read these forward-looking statements carefully because they discuss our expectations regarding our future performance, future operating results or future financial condition, or state other forward-looking information. You should be aware that the occurrence of any of the events described under "Risk Factors" herein, in our Annual Report on Form 10-K filed with the SEC on March 5, 2013, and in any document incorporated by reference herein and elsewhere in this prospectus supplement, the accompanying prospectus and the documents incorporated by reference therein could substantially harm our business, results of operations and financial condition and that upon the occurrence of any of these events, the price of our common stock could decline.

We cannot guarantee any future results, levels of activity, performance or achievements. Should one or more of these risks or uncertainties materialize, or should underlying assumptions prove incorrect, actual results may vary materially from those described in this prospectus supplement, the accompanying prospectus or the documents incorporated by reference herein or therein as anticipated, believed, estimated or expected. The forward-looking statements contained or incorporated by reference herein represent our expectations as of the date of such statements (unless another date is indicated) and should not be relied upon as representing our expectations as of any other date. While we may elect to update these forward-looking statements, we specifically disclaim any obligation to do so, even if our expectations change.

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All shares of our common stock offered by this prospectus supplement will be sold by the selling stockholders. We will not receive any of the proceeds from the sale of these shares.

SELLING STOCKHOLDERS

The following table presents information concerning the beneficial ownership of the shares of our common stock by the selling stockholders assuming 47,828,899 shares of common stock outstanding as of March 31, 2013, which includes all shares to be sold by the selling stockholders in connection with this offering.

The information in the table below with respect to each selling stockholder has been obtained from such selling stockholder. When we refer to the selling stockholders in this prospectus supplement, we mean the selling stockholders listed in the table below as offering shares, as well as their respective pledgees, donees, assignees, transferees and successors and others who may hold any of such selling stockholder's interest.

| | Shares Beneficially Owned Prior to the Offering | | Shares Offered | Shares Beneficially Owned After the Offering Assuming No Exercise of the Over-Allotment Option | | Shares Beneficially Owned After the Offering Assuming Full Exercise of the Over-Allotment Option | |
|-------------------------------------|---|---------|----------------|--|------------|--|------------|
| | Number | Percent | | Number | Percentage | Number | Percentage |
| Beacon Company (1) | 5,708,282 | 11.93% | 4,250,000 | 1,458,282 | 3.05% | 820,782 | 1.72% |
| Rosebay Medical Company L.P. (2) | 5,708,283 | 11.93% | 4,250,000 | 1,458,283 | 3.05% | 820,783 | 1.72% |

(1) This amount includes 2,708,282 shares held by PPLP, an associated company of the selling stockholder, which shares will be transferred by PPLP to the selling stockholder in connection with the sale of the shares offered hereby. Rosebay Medical Company L.P. will hold a 50% economic interest on behalf of the selling stockholder in one share of the common stock to be transferred by PPLP to Rosebay Medical Company L.P.

(2) This amount includes 2,708,283 shares held by PPLP, an associated company of the selling stockholder, which shares will be transferred by PPLP to the selling stockholder in connection with the sale of the shares offered hereby. The selling stockholder will hold a 50% economic interest on behalf of Beacon Company in one share of the common stock to be transferred by PPLP to the selling stockholder.

For a discussion of certain arrangements between us and the selling stockholders, see the section entitled *Summary Agreement between Infinity and Selling Stockholders* in this prospectus supplement and the section entitled *Selling Stockholders* in the accompanying prospectus.

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Under the terms and subject to the conditions set forth in an underwriting agreement dated the date of this prospectus supplement, the underwriters named below, for whom Morgan Stanley & Co. LLC and J.P. Morgan Securities LLC are acting as representatives, have severally agreed to purchase, and the selling stockholders have agreed to sell to them, the number of shares of our common stock indicated below:

| Name | Number of Shares |
|----------------------------|------------------|
| Morgan Stanley & Co. LLC | |
| J.P. Morgan Securities LLC | |
| Total: | 8,500,000 |

The underwriters and the representatives are collectively referred to as the underwriters and the representatives, respectively. The underwriters are offering the shares of common stock subject to their acceptance of the shares from the selling stockholders and subject to prior sale. The underwriting agreement provides that the obligations of the several underwriters to pay for and accept delivery of the shares of common stock offered by this prospectus supplement are subject to the approval of certain legal matters by their counsel and to certain other conditions. The underwriters are obligated to take and pay for all of the shares of common stock offered by this prospectus supplement if any such shares are taken. However, the underwriters are not required to take or pay for the shares covered by the underwriters' option to purchase additional shares described below.

The underwriters initially propose to offer part of the shares of common stock directly to the public at the offering price listed on the cover page of this prospectus supplement and part to certain dealers. After the initial offering of the shares of common stock, the offering price and other selling terms may from time to time be varied by the representatives.

The selling stockholders have granted to the underwriters an option, exercisable for 30 days from the date of this prospectus supplement, to purchase up to 1,275,000 additional shares of common stock at the public offering price listed on the cover page of this prospectus supplement, less underwriting discounts and commissions, to cover over-allotments, if any. To the extent the option is exercised, each underwriter will become obligated, subject to certain conditions, to purchase about the same percentage of the additional shares of common stock as the number listed next to the underwriter's name in the preceding table bears to the total number of shares of common stock listed next to the names of all underwriters in the preceding table.

The following table shows the per share and total public offering price, underwriting discounts and commissions to be paid by the selling stockholders, and proceeds before expenses to the selling stockholders. These amounts are shown assuming both no exercise and full exercise of the underwriters' option to purchase up to an additional 1,275,000 shares of our common stock.

| | Per Share | No Exercise | Total Full Exercise |
|---|--------------|-------------|------------------------|
| Public offering price | \$ | \$ | \$ |
| Underwriting discounts and commissions to be paid by the selling stockholders | \$ | \$ | \$ |
| Proceeds, before expenses, to the selling stockholders | \$ | \$ | \$ |

The selling shareholders will pay all underwriting fees, discounts and commissions and all fees for its counsel. We estimate that our total expenses with respect to the offering will be approximately \$175,000.

Our common stock is listed on the NASDAQ Global Select Market under the trading symbol **INFI**.

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In connection with an underwritten offering of our common stock in December 2012, we, our directors and officers, the selling stockholders and Purdue Pharma L.P. agreed that, without the prior written consent of Morgan Stanley & Co. LLC and J.P. Morgan Securities LLC, we and they would not, until June 12, 2013 (the restricted period):

offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, lend or otherwise transfer or dispose of, directly or indirectly, any shares of common stock or any securities convertible into or exercisable or exchangeable for shares of common stock;

in our case, file any registration statement with the SEC relating to the offering of any shares of common stock or any securities convertible into or exercisable or exchangeable for common stock (other than a registration statement on Form S-8 or a successor form); or

enter into any swap or other arrangement that transfers to another, in whole or in part, any of the economic consequences of ownership of our common stock;

whether any such transaction described in the first and third bullets above is to be settled by delivery of common stock or such other securities, in cash or otherwise. In addition, each such director, officer, stockholder and optionholder agreed that, without the prior written consent of Morgan Stanley & Co. LLC and J.P. Morgan Securities LLC, such other person would not, during the restricted period, make any demand for, or exercise any right with respect to, the registration of any shares of common stock or any security convertible into or exercisable or exchangeable for common stock.

The restrictions described in the immediately preceding paragraph do not apply to:

the sale of shares to the underwriters;

in the case of our directors and officers and certain holders of our outstanding stock and stock options, certain bona fide gifts, transfer to affiliates or certain trusts and transfers by will or intestate succession, provided that any transferee, distributee or donee shall sign and deliver a lock-up agreement substantially in the form signed by our directors, officers and certain of our stockholders and optionholders and no filing under Section 16(a) of the Exchange Act shall be required or voluntarily made in connection with such a transaction during the restricted period;

the issuance by us of shares of common stock upon the exercise of an option or a warrant or the conversion of a security outstanding on the date of this prospectus supplement or of which the underwriters have been advised in writing;

the issuance by us of shares of our common stock issued in connection with a transaction with an unaffiliated third party that includes a bona fide commercial relationship with us (including joint ventures, marketing or distribution arrangements, collaboration agreements or intellectual property license agreements) or an acquisition of the business, stock or assets of such unaffiliated third party, provided that the aggregate number of shares of our common stock issued pursuant to this clause during the restricted period shall not exceed 10% of the total number of shares of our common stock issued and outstanding as of December 18, 2012 and, prior to the issuance of any shares of our common stock pursuant to this clause, the recipient of such shares signs a lock-up agreement substantially in the form of the lock-up agreement signed by our directors, officers and certain of our stockholders and optionholders; or

the establishment of a trading plan pursuant to Rule 10b5-1 under the Exchange Act 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 and, to the extent a public

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announcement or filing under the Exchange Act, if any, is required or voluntarily made regarding the establishment of such plan, such announcement or filing shall include a statement to the effect that no transfer of common stock may be made under such plan during the restricted period.

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The restricted period described above will be extended if:

during the last 17 days of the restricted period we issue an earnings release or material news or a material event relating to us occurs, or

prior to the expiration of the restricted period, we announce that we will release earnings results during the 16-day period beginning on the last day of the restricted period or provide notification to Morgan Stanley & Co. LLC and J.P. Morgan Securities LLC of any earnings release or material news or a material event that may give rise to an extension of the initial 180-day restricted period, in which case the restrictions described above will continue to apply until the expiration of the 18-day period beginning on the issuance of the earnings release or the occurrence of the material news or material event, subject to certain exceptions.

Notwithstanding the foregoing, we and each of Morgan Stanley & Co. LLC and J.P. Morgan Securities LLC have agreed to allow the selling stockholders to sell up to 9,775,000 shares of our common stock pursuant to this prospectus supplement prior to the termination of the lock-up period described above. This limited allowance relates only to the 9,775,000 shares of our common stock proposed to be sold to the public pursuant to this prospectus supplement and our directors and officers and the selling stockholders will otherwise remain subject to the restrictions set forth above.

In order to facilitate the offering of our common stock, the underwriters may engage in transactions that stabilize, maintain or otherwise affect the price of our common stock on the NASDAQ Global Select Market. Specifically, the underwriters may sell more shares than they are obligated to purchase under the underwriting agreement, creating a short position. A short sale is covered if the short position is no greater than the number of shares available for purchase by the underwriters under their option to purchase additional shares described above. The underwriters can close out a covered short sale by exercising the option or purchasing shares in the open market. In determining the source of shares to close out a covered short sale, the underwriters will consider, among other things, the open market price of shares compared to the price available under the option. The underwriters may also sell shares in excess of the option, creating a naked short position. The underwriters must close out any naked short position by purchasing shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of our common stock in the open market after pricing that could adversely affect investors who purchase in this offering. As an additional means of facilitating this offering, the underwriters may bid for, and purchase, shares of common stock in the open market to stabilize the price of our common stock. These activities may raise or maintain the market price of our common stock above independent market levels or prevent or retard a decline in the market price of our common stock. The underwriters are not required to engage in these activities and may end any of these activities at any time.

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

In addition, in connection with this offering the underwriters may engage in passive market making transactions in our common stock on the NASDAQ Global Select Market prior to the pricing and completion of this offering. Passive market making consists of displaying bids on the NASDAQ Global Select Market no higher than the bid prices of independent market makers and making purchases at prices no higher than these independent bids and effected in response to order flow. Net purchases by a passive market maker on each day are generally limited to a specified percentage of the passive market maker's average daily trading volume in the common stock during a specified period and must be discontinued when such limit is reached. Passive market making may cause the price of our common stock to be higher than the price that otherwise would exist in the

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open market in the absence of these transactions. If passive market making is commenced, it may be discontinued at any time.

We, the selling stockholders and the underwriters have agreed to indemnify each other against certain liabilities, including liabilities under the Securities Act.

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

Other Relationships

The underwriters and their affiliates are full service financial institutions engaged in various activities, which may include securities trading, commercial and investment banking, financial advisory, investment management, investment research, principal investment, hedging, financing and brokerage activities. The underwriters and certain of their affiliates have in the past performed and may in the future perform various financial advisory and investment banking services for us, for which they received or will receive customary fees and expenses.

In the ordinary course of their various business activities, the underwriters and their affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (including bank loans) for their own account and for the accounts of their customers, and such investment and securities activities may involve securities and/or instruments issued by us. The underwriters and their affiliates may also make investment recommendations and/or publish or express independent research views in respect of such securities or instruments and may at any time hold, or recommend to clients that they acquire, long and/or short positions in such securities and instruments.

Selling Restrictions

European Economic Area

In relation to each Member State of the European Economic Area which has implemented the Prospectus Directive (each, a Relevant Member State) an offer to the public of any shares of our common stock may not be made in that Relevant Member State, except that an offer to the public in that Relevant Member State of any shares of our common stock may be made at any time under the following exemptions under the Prospectus Directive, if they have been implemented in that Relevant Member State:

- (a) to any legal entity which is a qualified investor as defined in the Prospectus Directive;
- (b) 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 Prospectus Directive), as permitted under the Prospectus Directive; or
- (c) in any other circumstances falling within Article 3(2) of the Prospectus Directive, provided that no such offer of shares of our common stock shall result in a requirement for the publication by us or any underwriter of a prospectus pursuant to Article 3 of the Prospectus Directive.

For the purposes of this provision, the expression an offer to the public in relation to any shares of our common stock 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 any shares of our common stock to be offered so as to enable an investor to decide to purchase any shares of our common stock, as the same may be varied in that Member State by any measure implementing the Prospectus Directive in that Member State, the expression Prospectus

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Directive means Directive 2003/71/EC (and amendments thereto, including the 2010 PD Amending Directive, to the extent implemented in the Relevant Member State), and includes any relevant implementing measure in the Relevant Member State, and the expression 2010 PD Amending Directive means Directive 2010/73/EU.

United Kingdom

Each underwriter has represented and agreed that:

- (a) it has only communicated or caused to be communicated and will only communicate or cause to be communicated an invitation or inducement to engage in investment activity (within the meaning of Section 21 of the FSMA) received by it in connection with the issue or sale of the shares of our common stock in circumstances in which Section 21(1) of the FSMA does not apply to us; and
- (b) it has complied and will comply with all applicable provisions of the FSMA with respect to anything done by it in relation to the shares of our common stock in, from or otherwise involving the United Kingdom.

Switzerland

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

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

Dubai International Financial Centre

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

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LEGAL MATTERS

The validity of the shares of common stock offered hereby will be passed upon for us by Wilmer Cutler Pickering Hale and Dorr LLP. Certain legal matters in connection with this offering will be passed upon for the underwriters by Ropes & Gray LLP, Boston, Massachusetts. Partners of Wilmer Cutler Pickering Hale and Dorr LLP beneficially own 9,455 shares of our common stock.

EXPERTS

The consolidated financial statements of Infinity Pharmaceuticals, Inc. incorporated herein by reference to Infinity Pharmaceuticals, Inc.'s Annual Report on Form 10-K for the year ended December 31, 2012 and the effectiveness of Infinity Pharmaceuticals, Inc.'s internal control over financial reporting as of December 31, 2012, have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their reports thereon set forth therein, and incorporated herein by reference. Such consolidated financial statements are incorporated herein in reliance upon such reports given on the authority of such firm as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We file reports, proxy statements and other information with the SEC as required by the Exchange Act. You can find, copy and inspect information we file at the SEC's public reference room at 100 F Street, N.E., Room 1580, Washington, D.C. 20549. You can call the SEC at 1-800-SEC-0330 for further information about the public reference room. You can review our electronically filed reports, proxy and information statements on the SEC's website at <http://www.sec.gov> or on our website at <http://www.infi.com>. Information included on our website is not a part of this prospectus supplement or the accompanying prospectus.

This prospectus supplement is part of a registration statement that we filed with the SEC. The registration statement contains more information than this prospectus supplement and the accompanying prospectus regarding us and the securities, including certain exhibits and schedules. You can obtain a copy of the registration statement from the SEC at the address listed above or from the SEC's internet site.

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INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to incorporate into this prospectus supplement and the accompanying prospectus information that we file with the SEC in other documents. This means that we can disclose important information to you by referring to other documents that contain that information. The information incorporated by reference is considered to be part of this prospectus supplement and the accompanying prospectus. Information that we file with the SEC in the future and incorporate by reference in this prospectus supplement and the accompanying prospectus automatically updates and supersedes previously filed information as applicable. The following documents filed with the SEC pursuant to the Exchange Act are incorporated herein by reference (other than, in each case, documents or information deemed to have been furnished and not filed in accordance with SEC rules):

our Annual Report on Form 10-K for the year ended December 31, 2012, filed with the SEC on March 5, 2013;

portions of our definitive Proxy Statement on Schedule 14A, filed with the SEC on April 4, 2012 in connection with our 2012 annual meeting of stockholders, to the extent specifically incorporated by reference to our Annual Report on Form 10-K for the year ended December 31, 2011, filed with the SEC on March 13, 2012;

our Current Reports on Form 8-K filed with the SEC on January 7, 2013 (solely with respect to Item 8.01 therein), February 12, 2013, March 7, 2013 and April 9, 2013; and

the description of our common stock contained in our Registration Statement on Form 8-A filed with the SEC on July 25, 2000. In addition, this prospectus supplement incorporates by reference all documents and reports that we file pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act after the date of this prospectus supplement and prior to the completion or termination of this offering of common stock even though they are not specifically identified in this prospectus supplement.

You may request, orally or in writing, a copy of the documents which are incorporated by reference, which will be provided to you at no cost by contacting: Infinity Pharmaceuticals, Inc., 780 Memorial Drive, Cambridge, Massachusetts 02139, Attention: Investor Relations, (617) 453-1000.

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PROSPECTUS

INFINITY PHARMACEUTICALS, INC.
11,416,565 SHARES OF COMMON STOCK

This prospectus relates to resales of shares of common stock held by (i) Beacon Company, a Delaware general partnership, and Rosebay Medical Company L.P., a Delaware limited partnership, as transferees of Purdue Pharma L.P. and Purdue Pharmaceutical Products L.P., each a Delaware limited partnership, that were issued by Infinity Pharmaceuticals, Inc. in a private placement completed on November 19, 2008 and January 7, 2009, and (ii) Purdue Pharma L.P., a Delaware limited partnership, that were issued by Infinity Pharmaceuticals, Inc. in a private placement completed on September 7, 2012.

We will not receive any proceeds from the sale of the shares.

The selling stockholders identified in this prospectus, or their permitted pledgees, donees, transferees or other successors-in-interest, may offer the shares from time to time through public or private transactions at prevailing market prices, at prices related to prevailing market prices or at privately negotiated prices.

Our common stock is listed on the NASDAQ Global Select Market under the symbol INFI. On September 27, 2012, the reported last sale price of our common stock on the NASDAQ Global Select Market was \$23.29 per share. You are urged to obtain current market quotations for our common stock.

Investing in our common stock involves a high degree of risk. See Risk Factors beginning on page 3 of this prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus is October 19, 2012.

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PROSPECTUS SUMMARY

This summary highlights important features of this offering and the information included or incorporated by reference in this prospectus. This summary does not contain all of the information that you should consider before investing in our common stock. You should read the entire prospectus carefully, especially the risks of investing in our common stock discussed under Risk Factors.

INFINITY PHARMACEUTICALS, INC.

Our Business

We are an innovative drug discovery and development company seeking to discover, develop and deliver to patients best-in-class medicines designed to address diseases with significant unmet need. We combine proven scientific expertise with a passion for developing novel small molecule drugs that target emerging disease pathways. Our programs focused on the inhibition of phosphoinositide-3-kinase, the heat shock protein 90 chaperone system, and fatty acid amide hydrolase are evidence of our innovative approach to drug discovery and development. We have worldwide rights to all of our development candidates and early discovery programs, subject to certain financial obligations to our current and former development partners.

PI3K Inhibitor Program. The phosphoinositide-3-kinases, or PI3Ks, are a family of enzymes involved in key immune cell functions, including cell proliferation and survival, cell differentiation and cellular trafficking. PI3K-delta and PI3K-gamma, two isoforms of PI3K, play key roles in inflammatory and autoimmune diseases. Additionally, in certain hematologic malignancies, PI3K-gamma and PI3K-delta contribute to the survival and proliferation of cancer cells. Therefore, inhibition of PI3K-delta and PI3K-gamma may have therapeutic potential across a broad range of inflammatory diseases and hematologic malignancies. Our lead compound in this program is IPI-145, a potent, oral inhibitor of PI3K-delta and PI3K-gamma, for which we are conducting clinical studies in both inflammation and hematologic malignancies. We believe IPI-145 is the first delta-gamma inhibitor in the clinic. We are also conducting discovery activities to identify additional PI3K-delta and/or PI3K-gamma inhibitors, which we believe will optimize the development of our portfolio of PI3K inhibitors across a broad range of indications.

Hsp90 Inhibitor Program. Retaspimycin hydrochloride (HCl), also known as IPI-504, is a novel, potent and selective inhibitor of heat shock protein 90, or Hsp90. Cancer cells depend on Hsp90 to maintain many proteins critical for cancer growth, proliferation and survival in a functional state. Certain anticancer therapies may enhance the dependency of cancer cells on Hsp90. Therefore, combining an Hsp90 inhibitor with another anticancer therapy may enhance cancer cell killing. Retaspimycin HCl is currently being evaluated in two phase 2 clinical studies including a randomized, double-blind, placebo-controlled Phase 2 clinical trial in combination with docetaxel, a chemotherapy, compared to placebo and docetaxel in approximately 200 patients with second- or third-line non-small cell lung cancer, or NSCLC, who are naive to docetaxel treatment and have a history of heavy smoking.

FAAH Inhibitor Program. In July 2012, we reacquired from Purdue Pharmaceutical Products L.P. and its associated company, Mundipharma International Corporation Limited, the global development and commercialization rights for products arising out of a program directed toward fatty acid amide hydrolase, or FAAH. It is believed that inhibition of FAAH may enable the body to bolster its own analgesic and anti-inflammatory response, and may have applicability in a broad range of painful or inflammatory conditions. The lead compound in our FAAH program is IPI-940, a novel, orally available inhibitor of FAAH with potential application for the treatment of a broad range of painful or inflammatory diseases.

Company Information

We were incorporated in California on March 22, 1995, under the name IRORI and, in 1998, we changed our name to Discovery Partners International, Inc., or DPI. In July 2000, we reincorporated in Delaware. On September 12, 2006, DPI completed a merger with Infinity Pharmaceuticals, Inc., or IPI, pursuant to which a wholly-owned subsidiary of DPI merged with and into IPI. IPI was the surviving corporation in the merger,

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changed its name to Infinity Discovery, Inc. and became a wholly owned subsidiary of DPI. In addition, we changed our corporate name from Discovery Partners International, Inc. to Infinity Pharmaceuticals, Inc., and our ticker symbol on the NASDAQ Global Market to INFI. Our common stock currently trades on the NASDAQ Global Select Market.

Our principal executive offices are located at 780 Memorial Drive, Cambridge, Massachusetts 02139 and our telephone number at that address is (617) 453-1000. Our website is located at www.infi.com. We regularly use our website to post information regarding our business, product development programs and governance, and we encourage you to use our website, particularly in the section entitled Investors/Media, as a source of information about us. We have not incorporated by reference into this prospectus the information on our website and you should not consider it to be a part of this document. Our website address is included as an inactive textual reference only.

Unless the context otherwise requires, references in this prospectus to Infinity, we, us, and our refer to Infinity Pharmaceuticals, Inc. and its subsidiary.

We have not authorized anyone to provide you with information different from that contained or incorporated by reference in this prospectus. The selling stockholders are offering to sell, and seeking offers to buy, shares of our common stock only in jurisdictions where offers and sales are permitted. The information contained in this prospectus is accurate only as of the date of this prospectus, regardless of the time of delivery of this prospectus or of any sale of common stock.

THE OFFERING

| | |
|--|---|
| Common Stock offered by selling stockholders | 11,416,565 shares |
| Use of proceeds | We will not receive any proceeds from the sale of the shares in the offering. |
| NASDAQ Global Select Market symbol | INFI |

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RISK FACTORS

Investing in our common stock involves significant risks. In addition to the other information included or incorporated by reference in this prospectus, you should carefully consider the risks described in Part II. Item 1A. Risk Factors in our Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2012, which we have filed with the SEC and which is incorporated by reference herein, before making an investment decision. We caution you that the risks and uncertainties we have described, among others, could cause our actual results to differ materially from those expressed in forward-looking statements made by us or on our behalf in filings with the SEC, press releases, communications with investors and oral statements. We undertake no obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise. You are advised, however, to consult any further disclosure we make in our reports filed with the SEC.

SPECIAL NOTE REGARDING FORWARD-LOOKING INFORMATION

This prospectus includes and incorporates forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. Such forward-looking statements include statements about our expectations with respect to the possible achievement of discovery and development milestones, our future discovery and development efforts, our collaborations, our future operating results and financial position, our business strategy, and other objectives for future operations. We often use words such as anticipate, believe, estimate, expect, intend, may, plan, project, target, potential, will, would, could, should, continue, and other words and terms of similar meaning to help identify forward-looking statements, although not all forward-looking statements contain these identifying words. You also can identify them by the fact that they do not relate strictly to historical or current facts. There are a number of important risks and uncertainties that could cause actual results or events to differ materially from those indicated by forward-looking statements. These risks and uncertainties include those inherent in pharmaceutical research and development, such as adverse results in our drug discovery and clinical development activities, decisions made by the U.S. Food and Drug Administration and other regulatory authorities with respect to the development and commercialization of our drug candidates, our ability to obtain, maintain and enforce intellectual property rights for our drug candidates, our dependence on our alliance partners, our ability to obtain any necessary financing to conduct our planned activities, and other risk factors. Please refer to the section entitled Risk Factors of this prospectus and in any information incorporated by reference in this prospectus for a description of these risks and uncertainties as well as any other risk factors and cautionary statements described in the documents we file from time to time with the SEC, specifically our most recent Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and our Current Reports on Form 8-K. Unless required by law, we do not undertake any obligation to publicly update any forward-looking statements.

Table of Contents**USE OF PROCEEDS**

We are filing the registration statement of which this prospectus is a part to permit the holders of the shares of our common stock described in the section entitled "Selling Stockholders" to resell such shares. We will not receive any proceeds from the resale of shares by the selling stockholders. Each selling stockholder will pay any underwriting discounts and commissions and expenses incurred by such selling stockholder for brokerage, accounting, tax or legal services or any other expenses incurred by such selling stockholder in disposing of the shares. We will bear all other costs, fees and expenses incurred in effecting the registration of the shares covered by this prospectus, including, without limitation, all registration and filing fees, NASDAQ Global Select Market listing fees and fees and expenses of our counsel and our auditors.

SELLING STOCKHOLDERS

On November 19, 2008, we sold 4,000,000 shares of our common stock in a private placement to Purdue Pharma L.P. and Purdue Pharmaceutical Products L.P., which we refer to herein as the 2008 Initial Purchasers, in connection with our execution of a securities purchase agreement with such parties, which we refer to herein as the 2008 Purchase Agreement. Further, on January 7, 2009, we sold 2,000,000 shares of our common stock, and warrants to purchase 6,000,000 shares of our common stock, to the 2008 Initial Purchasers pursuant to the 2008 Purchase Agreement. All of such shares, as well as all of such warrants, were subsequently transferred through associated entities of the 2008 Initial Purchasers to Beacon Company, which we refer to herein as Beacon, and Rosebay Medical Company L.P., which we refer to herein as Rosebay. In accordance with the 2008 Purchase Agreement, we filed a Registration Statement on Form S-3 with the Securities and Exchange Commission on December 17, 2008, as amended by Amendment No. 1 to such Registration Statement on Form S-3 filed on January 9, 2009, to effect the registration of such shares and the shares issuable upon exercise of such warrants held by Beacon and Rosebay, which we refer to as the Prior Registration Statement. The warrants have since expired without having been exercised. We have included 6,000,000 shares of our common stock that remained unsold under the Prior Registration Statement in the number of shares offered by this prospectus.

On September 7, 2012, we sold 5,416,565 shares of our common stock in a private placement to Purdue Pharma L.P., or PPLP, pursuant to a securities purchase agreement we entered into with PPLP, Beacon and Rosebay, on July 17, 2012, which we refer to herein as the 2012 Purchase Agreement.

The table below sets forth, to our knowledge, certain information about PPLP, Beacon and Rosebay, which we refer to herein collectively as the selling stockholders, as of September 7, 2012. On September 7, 2012, 39,294,009 shares of our common stock were outstanding.

We do not know when or in what amounts the selling stockholders may offer shares for sale. The selling stockholders might not sell any or all of the shares offered by this prospectus. Because the selling stockholders may offer all or some of the shares pursuant to this offering and because there are currently no agreements or understandings with respect to the sale of any shares, we cannot estimate the number of shares that will be held by the selling stockholders after completion of this offering. However, for purposes of this table, we have assumed that, after completion of this offering, none of the shares covered by this prospectus will be held by the selling stockholders.

| Name of Selling Stockholder | Shares of Common Stock | | Number of Shares of Common Stock Being Offered | Shares of Common Stock to be Beneficially Owned After Offering | |
|----------------------------------|--------------------------------------|------------|--|--|------------|
| | Beneficially Owned Prior to Offering | | | Number | Percentage |
| | Number | Percentage | | | |
| Beacon Company (1) | 8,416,565 | 21.4% | 3,000,000 | 0 | * |
| Rosebay Medical Company L.P. (2) | 8,416,565 | 21.4% | 3,000,000 | 0 | * |
| Purdue Pharma L.P. | 5,416,565 | 13.8% | 5,416,565 | 0 | * |

* Less than one percent.

- (1) As of September 7, 2012, Beacon beneficially owned 8,416,565 shares, or 21.4%, of our common stock outstanding, which consists of (i) 3,000,000 shares held directly by Beacon and (ii) 5,416,565 shares held by

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PPLP, Beacon and Rosebay are the ultimate parents of PPLP, and as such, Beacon and Rosebay share power to vote or direct the vote and dispose or direct the disposition of the 5,416,565 shares held by PPLP. Beacon disclaims beneficial ownership of the securities held by PPLP except to the extent of its pecuniary interest therein.

- (2) As of September 7, 2012, Rosebay beneficially owned 8,416,565 shares, or 21.4%, of our common stock outstanding, which consists of (i) 3,000,000 shares held directly by Rosebay and (ii) 5,416,565 shares held by PPLP. Rosebay and Beacon are the ultimate parents of PPLP, and as such, Rosebay and Beacon share power to vote or direct the vote and dispose or direct the disposition of the 5,416,565 shares held by PPLP. Rosebay disclaims beneficial ownership of the securities held by PPLP except to the extent of its pecuniary interest therein. None of the selling stockholders nor any of their affiliates, officers, directors or holders of 5% or more of their respective share capital had held any position or office with us or any of our subsidiaries within the past three years.

Voting and Observer Rights

Pursuant to the 2012 Purchase Agreement, until September 7, 2017, the selling stockholders and each associated company holding shares of our common stock have agreed to be present at each regular or special meeting of our stockholders and to vote all of their shares of common stock as recommended by our board of directors in the proxy materials mailed to our stockholders in connection with such meeting, except that with respect to any proposal to amend our corporate charter or approve certain extraordinary transactions, all shares of common stock that are owned by those entities that were not acquired pursuant to the 2012 Purchase Agreement will be voted in proportion to the manner in which all of our stockholders (other than those entities) vote in respect of such proposal, regardless of the recommendation of our board of directors.

The 2008 Purchase Agreement gave the 2008 Initial Purchasers the right to appoint one representative to attend regular meetings of our board of directors, which right terminated upon entering into the 2012 Purchase Agreement.

Registration Rights

The 2012 Purchase Agreement also provides that any time in the period beginning January 1, 2013 and ending December 31, 2018, in the event we propose to make an underwritten offering of our common stock, subject to certain limitations, the selling stockholders will have certain rights, which require us, at the election of the selling stockholders, to use our reasonable best efforts to cause to be included in such underwritten offering common stock then held by the selling stockholders representing up to 20% of the total estimated maximum dollar amount of common stock proposed to be sold in such underwritten offering.

In addition, the selling stockholders agreed in the 2012 Purchase Agreement to enter into a lockup agreement if requested by us and/or the managing underwriters, placement agents or initial purchasers for any offering of our stock prior to December 31, 2013, pursuant to which the selling stockholders will agree not to, among other things, offer, sell or otherwise transfer or dispose of, directly or indirectly, any common stock held by the selling stockholders or to enter into any agreement that transfers, in whole or in part, any of the economic consequences of ownership of any common stock held by the selling stockholders, for a specified period of time requested by us, the managing underwriters, the placement agents or the initial purchasers. Pursuant to such provision and as requested by us, the selling stockholders entered into lockup agreements on substantially the terms set forth in an exhibit to the underwriting agreement we entered into on August 9, 2012 in connection with our offering of 6,095,000 shares of common stock.

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Termination and Revised Relationship Agreements

On July 17, 2012, we entered into termination and revised relationship agreements, which we refer to as the Termination and Revised Relationship Agreements, with Mundipharma International Corporation Limited, an associated company of the selling stockholders, or Mundipharma, and Purdue Pharmaceutical Products L.P., an associated company of the selling stockholders, or Purdue. The Termination and Revised Relationship Agreements terminated the strategic alliance agreements, which we refer to as the Strategic Alliance Agreements, that had governed the strategic alliance we had entered into with each of Mundipharma and Purdue in November 2008 to develop and commercialize pharmaceutical products. The agreement with Purdue focused on the development and commercialization in the United States of products targeting fatty acid amide hydrolase, or FAAH. The agreement with Mundipharma focused on the development and commercialization outside of the United States of all products and product candidates covered by the alliance, including those targeting FAAH. The alliance included product candidates that inhibit or target the Hedgehog pathway, FAAH, phosphoinositide-3-kinase and product candidates arising out of our early discovery projects in all disease fields that were conducted during the pendency of the Strategic Alliance Agreements.

Under the terms of the Termination and Revised Relationship Agreements:

all intellectual property rights that we had previously licensed to Mundipharma and Purdue to develop and commercialize products under the Strategic Alliance Agreements terminated, with the result that we have sole, worldwide development and commercialization rights to all product candidates that had previously been covered by the strategic alliance;

Mundipharma has no further obligation to provide research and development funding to us; and

we are obligated to pay Mundipharma and Purdue a 4% royalty in the aggregate (subject to reduction in accordance with the 2012 Purchase Agreement), on worldwide net sales of products that were covered by the alliance until such time as they have recovered all research and development expenses paid to us under the strategic alliance. After this cost recovery, we will owe: (i) Purdue a 1% royalty on net sales in the United States of products targeting FAAH that were subject to the strategic alliance, and (ii) Mundipharma a 1% royalty on net sales in the United States of all products that were subject to the strategic alliance other than those targeting FAAH.

Royalties are payable until the later to occur of the last-to-expire of specified patent rights and the expiration of non-patent regulatory exclusivities in a country, provided that if royalties are payable solely on the basis of non-patent regulatory exclusivity, each of the royalty rates is reduced by one-half. In addition, royalties payable under the Termination and Revised Relationship Agreements after Mundipharma and Purdue have recovered all research and development expenses paid to us are subject to reduction on account of third party royalty payments or patent litigation damages or settlements required to be paid by us, with any such reductions capped at 50% of the amounts otherwise payable during the applicable royalty payment period.

Each of the Termination and Revised Relationship Agreements expires when the parties thereto have no further obligations to each other thereunder.

Line of Credit Agreement

In connection with entering into the Strategic Alliance Agreements, we entered into a line of credit agreement in November 2008 with PPLP and Purdue, which we refer to as the Line of Credit Agreement. In March 2009, Purdue assigned its interest under the Line of Credit Agreement to PPLP. The Line of Credit Agreement provided for the borrowing by us of one or more unsecured loans up to an aggregate maximum principal amount of \$50 million. In November 2011, we borrowed \$50 million under this line of credit. The Line of Credit Agreement terminated in its entirety upon the closing of the private placement with PPLP on September 7, 2012, at which time PPLP converted and cancelled all of the principal and interest we owed to PPLP under the Line of Credit Agreement into shares of our common stock pursuant to the 2012 Purchase Agreement.

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Rights Agreement

Under the terms of our Rights Agreement with American Stock Transfer & Trust Company, LLC, dated February 13, 2003, as amended to date, which we refer to as the Rights Agreement, Purdue, PPLP and their associated companies may own up to 33.3% of our fully-diluted common stock outstanding (which assumes the exercise or conversion of all exercisable or convertible securities then outstanding) without such ownership causing such parties to be deemed Acquiring Persons for purposes of the Rights Agreement and thereby triggering the stockholder rights under the Rights Agreement. Should Purdue, PPLP and their associated companies' aggregate ownership percentage exceed 33.3% of our fully-diluted common stock outstanding as a result of an acquisition of common stock by us or the exercise or cancellation of outstanding securities that are exercisable, convertible or exchangeable for shares of common stock, the amendment to the Rights Agreement provides that such excess ownership shall not result in such parties being deemed Acquiring Persons for the purposes of the Rights Agreement.

PLAN OF DISTRIBUTION

The shares covered by this prospectus may be offered and sold from time to time by the selling stockholders. The term selling stockholders includes donees, pledgees, transferees or other successors-in-interest selling shares received after the date of this prospectus from the selling stockholders as a gift, pledge, distribution or other non-sale related transfer. The selling stockholders will act independently of us in making decisions with respect to the timing, manner and size of each sale. Such sales may be made on one or more exchanges or in the over-the-counter market or otherwise, at prices and under terms then prevailing or at prices related to the then current market price or in negotiated transactions. The selling stockholders may sell their shares by one or more of, or a combination of, the following methods:

purchases by a broker-dealer as principal and resale by such broker-dealer for its own account pursuant to this prospectus;

ordinary brokerage transactions and transactions in which the broker solicits purchasers;

an over-the-counter distribution in accordance with the rules of The Nasdaq Stock Market;

in privately negotiated transactions;

in options transactions;

to or through underwriters;

through dealers or agents;

a block trade in which the broker or dealer so engaged will attempt to sell the securities as an agent but may position and resell a portion of the block as a principal to facilitate the transaction;

through a combination of these methods; and

by any other legally available means.

In addition, any shares that qualify for sale pursuant to Rule 144 may be sold under Rule 144 rather than pursuant to this prospectus.

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To the extent required, this prospectus may be amended or supplemented from time to time to describe a specific plan of distribution. In connection with the distributions of shares or otherwise, the selling stockholders may enter into hedging transactions with broker-dealers or other financial institutions. In connection with such transactions, broker-dealers or other financial institutions may engage in short sales of the common stock in the course of hedging the positions they assume with the selling stockholders. The selling stockholders may enter into option or other transactions with broker-dealers or other financial institutions which require the delivery to such broker-dealer or other financial institution of shares offered by this prospectus, which shares such broker-dealer or other financial institution may resell pursuant to this prospectus (as supplemented or amended to reflect such transaction). The selling stockholders may also pledge shares to a broker-dealer or other financial institution, and, upon a default, such broker-dealer or other financial institution, may effect sales of the pledged shares pursuant to this prospectus (as supplemented or amended to reflect such transaction).

In effecting sales, underwriters, broker-dealers or agents engaged by the selling stockholders may arrange for other underwriters or broker-dealers to participate. Underwriters, broker-dealers or agents may receive commissions, discounts or concessions from the selling stockholders in amounts to be negotiated immediately prior to the sale. Such discounts, concessions or commissions as to particular underwriters, broker-dealers or agents may be in excess of those customary on the types of transactions involved.

In offering the shares covered by this prospectus, the selling stockholders and any broker-dealers who execute sales for the selling stockholders may be deemed to be underwriters within the meaning of the Securities Act in connection with such sales. Any profits realized by the selling stockholders and the compensation of any broker-dealer may be deemed to be underwriting discounts and commissions. Some of the underwriters or deemed underwriters or agents and their associates may be customers of, engage in transactions with, and perform services for, us in the ordinary course of business.

In order to comply with the securities laws of certain states, if applicable, the shares must be sold in such jurisdictions only through registered or licensed brokers or dealers. In addition, in certain states, the shares may not be sold unless they have been registered or qualified for sale in the applicable state or an exemption from the registration or qualification requirement is available and is complied with.

We have advised the selling stockholders that the anti-manipulation rules of Regulation M under the Exchange Act may apply to sales of shares in the market and to the activities of the selling stockholders and their affiliates. In addition, we will make copies of this prospectus available to the selling stockholders for the purpose of satisfying the prospectus delivery requirements of the Securities Act. The selling stockholders may indemnify any broker-dealer that participates in transactions involving the sale of the shares against certain liabilities, including liabilities arising under the Securities Act.

At the time a particular offer of shares is made, if required, a prospectus supplement will be distributed that will set forth the number of shares being offered and the terms of the offering, including the name of any underwriter, dealer or agent, the purchase price paid by any underwriter, any discount, commission and other item constituting compensation, any discount, commission or concession allowed or reallocated or paid to any dealer, and the proposed selling price to the public.

We will pay all expenses of the registration of the shares of common stock pursuant to the 2008 Purchase Agreement and 2012 Purchase Agreement, including, without limitation, Securities and Exchange Commission, or SEC, filing fees and expenses of compliance with state securities or blue sky laws; *provided, however*, that the selling stockholders will pay all underwriting discounts, commissions and concessions and brokers or agents commissions and concessions or selling commissions and concessions, if any. We have agreed to indemnify the selling stockholders against certain liabilities, including certain liabilities under the Securities Act. Underwriters, dealers and agents may be entitled to indemnification by us and the selling stockholders against specific civil liabilities, including liabilities under the Securities Act or to contribution with respect to payments which the underwriters or agents may be required to make in respect thereof, under underwriting or other agreements. The terms of any indemnification provisions will be set forth in a prospectus supplement.

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We have agreed with the selling stockholders to keep the registration statement of which this prospectus constitutes a part effective until such time as all of the shares covered by this prospectus have been sold or may be sold without volume restrictions pursuant to Rule 144.

LEGAL MATTERS

The validity of the shares offered by this prospectus has been passed upon by Wilmer Cutler Pickering Hale and Dorr LLP. Partners of Wilmer Cutler Pickering Hale and Dorr LLP beneficially own 9,455 shares of our common stock.

EXPERTS

The consolidated financial statements of Infinity Pharmaceuticals, Inc. appearing in Infinity Pharmaceuticals, Inc.'s Annual Report (Form 10-K) for the year ended December 31, 2011, and the effectiveness of Infinity Pharmaceuticals, Inc.'s internal control over financial reporting as of December 31, 2011 have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their reports thereon, included therein, and incorporated herein by reference. Such consolidated 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.

WHERE YOU CAN FIND MORE INFORMATION

We file reports, proxy statements and other documents with the SEC. You may read and copy any document we file at the SEC's public reference room at 100 F Street, N.E., Room 1580, Washington, D.C. 20549. You should call 1-800-SEC-0330 for more information on the public reference room. Our SEC filings are also available to you on the SEC's Internet site at www.sec.gov.

This prospectus is part of a registration statement that we filed with the SEC. The registration statement contains more information than this prospectus regarding us and our common stock, including certain exhibits and schedules. You can obtain a copy of the registration statement from the SEC at the address listed above or from the SEC's Internet site.

INCORPORATION OF CERTAIN DOCUMENTS BY REFERENCE

The SEC allows us to incorporate into this prospectus information that we file with the SEC in other documents. This means that we can disclose important information to you by referring to other documents that contain that information. The information incorporated by reference is considered to be part of this prospectus. Information that we file with the SEC in the future and incorporate by reference in this prospectus automatically updates and supersedes previously filed information as applicable. The following documents filed with the SEC pursuant to the Exchange Act are incorporated herein by reference (other than, in each case, documents or information deemed to have been furnished and not filed in accordance with SEC rules):

- (1) Our Annual Report on Form 10-K for the year ended December 31, 2011, as filed with the SEC on March 13, 2012, including portions of our definitive Proxy Statement on Schedule 14A, as filed with the SEC on April 4, 2012 in connection with our 2012 annual meeting of stockholders, to the extent specifically incorporated by reference therein;
- (2) Our Quarterly Reports on Form 10-Q for the quarterly periods ended (i) March 31, 2012, as filed with the SEC on May 8, 2012, and (ii) June 30, 2012, as filed with the SEC on August 7, 2012;

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- (3) Our Current Reports on Form 8-K filed with the SEC on January 9, 2012 (solely with respect to Item 8.01 therein), January 27, 2012, March 13, 2012 (solely with respect to Item 5.02 therein); May 18, 2012; June 18, 2012; July 2, 2012; July 17, 2012; July 19, 2012; July 25, 2012 and August 10, 2012;
- (4) Any other filings we make pursuant to the Exchange Act after the date of filing the initial registration statement and prior to effectiveness of the registration statement;
- (5) The description of our common stock contained in our Registration Statement on Form 8-A filed with the SEC on July 25, 2000; and
- (6) The description of our preferred stock purchase rights contained in our Registration Statement on Form 8-A filed with the SEC on February 24, 2003, as amended on November 20, 2008, including any amendments or reports filed for the purpose of updating those descriptions.

A statement contained in a document incorporated by reference into this prospectus shall be deemed to be modified or superceded for purposes of this prospectus to the extent that a statement contained in this prospectus, any prospectus supplement or in any other subsequently filed document which is also incorporated in this prospectus modifies or replaces such statement. Any statements so modified or superceded shall not be deemed, except as so modified or superceded, to constitute a part of this prospectus.

You may request a copy of these documents, which will be provided to you at no cost, by writing or telephoning us using the following contact information:

Infinity Pharmaceuticals, Inc.

780 Memorial Drive

Cambridge, Massachusetts 02139

Attention: Investor Relations

(617) 453-1000

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8,500,000 Shares of Common Stock

PROSPECTUS SUPPLEMENT

Morgan Stanley

J.P. Morgan

April , 2013