

MERRIMACK PHARMACEUTICALS INC
Form 10-K
March 04, 2014
Table of Contents

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2013

or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____

Commission file number 001-35409

Merrimack Pharmaceuticals, Inc.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)
One Kendall Square, Suite B7201
Cambridge, MA
(Address of principal executive offices)
Registrant's telephone number, including area code: (617) 441-1000

04-3210530
(I.R.S. Employer
Identification No.)
02139
(Zip Code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Common Stock, \$0.01 par value	NASDAQ Global Market
Securities registered pursuant to Section 12(g) of the Act: None	

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate website, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of large accelerated filer, accelerated filer and smaller reporting company in Rule 12b-2 of the Exchange Act.

Large accelerated filer Accelerated filer x
Non-accelerated filer (Do not check if a smaller reporting company) Smaller reporting company
Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes No

Aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant, based on the last sale price for such stock on June 28, 2013: \$604,930,711.

As of February 28, 2014, there were 103,038,416 shares of Common Stock, \$0.01 par value per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

The registrant intends to file a definitive proxy statement pursuant to Regulation 14A in connection with its 2014 Annual Meeting of Stockholders. Portions of such proxy statement are incorporated by reference into Part III of this Annual Report on Form 10-K.

Table of Contents

TABLE OF CONTENTS

PART I

Item 1.	<u>Business</u>	2
Item 1A.	<u>Risk Factors</u>	45
Item 1B.	<u>Unresolved Staff Comments</u>	74
Item 2.	<u>Properties</u>	75
Item 3.	<u>Legal Proceedings</u>	75
Item 4.	<u>Mine Safety Disclosures</u>	75

PART II

Item 5.	<u>Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities</u>	76
Item 6.	<u>Selected Financial Data</u>	78
Item 7.	<u>Management's Discussion and Analysis of Financial Condition and Results of Operations</u>	80
Item 7A.	<u>Quantitative and Qualitative Disclosures About Market Risk</u>	102
Item 8.	<u>Financial Statements and Supplementary Data</u>	102
Item 9.	<u>Changes in and Disagreements With Accountants on Accounting and Financial Disclosure</u>	102
Item 9A.	<u>Controls and Procedures</u>	102
Item 9B.	<u>Other Information</u>	103

PART III

Item 10.	<u>Directors, Executive Officers and Corporate Governance</u>	104
Item 11.	<u>Executive Compensation</u>	104
Item 12.	<u>Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters</u>	104
Item 13.	<u>Certain Relationships and Related Transactions, and Director Independence</u>	104
Item 14.	<u>Principal Accounting Fees and Services</u>	104

PART IV

Item 15.	<u>Exhibits and Financial Statement Schedules</u>	105
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Table of Contents

FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains forward-looking statements that involve substantial risks and uncertainties. All statements, other than statements of historical facts, contained in this Annual Report on Form 10-K, including statements regarding our strategy, future operations, future financial position, future revenues, projected costs, prospects, plans and objectives of management, are forward-looking statements. The words anticipate, believe, estimate, expect, intend, may, plan, predict, project, target, potential, will, would, could, and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words.

The forward-looking statements in this Annual Report on Form 10-K include, among other things, statements about:

our plans to develop and commercialize our most advanced product candidates and companion diagnostics;

our ongoing and planned discovery programs, preclinical studies and clinical trials;

the timing of the completion of our clinical trials and the availability of results from such trials;

our collaborations with PharmaEngine, Inc. related to MM-398 and with Sanofi related to MM-121;

our ability to establish and maintain additional collaborations;

the timing of and our ability to obtain and maintain regulatory approvals for our product candidates;

the rate and degree of market acceptance and clinical utility of our products;

our intellectual property position;

our commercialization, marketing and manufacturing capabilities and strategy;

the potential advantages of our Network Biology approach to drug research and development;

the potential use of our Network Biology approach in fields other than oncology; and

our estimates regarding expenses, future revenues, capital requirements and needs for additional financing.

We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. We have included important factors in the cautionary statements included in this Annual Report on Form 10-K, particularly in Part I, Item 1A. Risk Factors, that could cause actual results or events to differ materially from the forward-looking statements that we make. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments that we may make.

You should read this Annual Report on Form 10-K and the documents that we have filed as exhibits to this Annual Report on Form 10-K completely and with the understanding that our actual future results may be materially different from what we expect. We do not assume any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law.

Table of Contents

PART I

Item 1. Business

Overview

We are a biopharmaceutical company discovering, developing and preparing to commercialize innovative medicines consisting of novel therapeutics paired with companion diagnostics for the treatment of cancer. We were founded by a team of scientists from The Massachusetts Institute of Technology and Harvard University who sought to develop a systems biology-based approach to biomedical research. The core of our approach to systems biology is to apply multidisciplinary and multitechnology capabilities to build functional and predictive computational models of biological systems, such as cell signaling networks, that allow us to engineer treatments that are directed at the mechanisms of disease. Our mission is to employ these insights to provide patients, physicians and the healthcare system with the medicines, tools and information to deliver integrated healthcare solutions that improve both the quality of outcomes and the efficiency of care.

We currently have six targeted therapeutic oncology candidates in clinical development. In our most advanced program, we are conducting a Phase 3 clinical trial. Additionally, we have multiple product candidates in preclinical development and a discovery effort advancing additional candidate medicines. We have tailored each of our six most advanced product candidates to target specific disease mechanisms that our research suggests are common across many solid tumor types. We believe that these product candidates have the potential to address major unmet medical needs.

We are also developing *in vitro* and *in vivo* companion diagnostics for use with each of our oncology therapeutic product candidates. Our *in vitro* companion diagnostic agents employ biophysical or biochemical markers of cancer, or biomarkers, which we have identified using our systems biology approach. Our *in vivo* companion diagnostics take the form of imaging agents that may help identify patients likely to benefit from our therapeutic products by measuring deposition of our products in the tumor. We believe that companion diagnostics will allow us to improve the efficiency and productivity of our clinical development and enhance the potential efficacy and pharmacoeconomic benefit of our therapeutics.

We have also recently entered into an agreement to utilize our manufacturing expertise to develop, manufacture and exclusively supply bulk drug to a third party, who will in turn process the drug into finished product and commercialize it globally.

Our Most Advanced Product Candidates

The table and descriptions below summarize key information about our six most advanced therapeutic product candidates, MM-398, MM-121, MM-111, MM-302, MM-151 and MM-141. All of these product candidates are designed for intravenous administration. None of our product candidates are approved for any indication by the U.S. Food and Drug Administration, or FDA, or any other regulatory agency.

Table of Contents

Each of the product candidates described below is a targeted therapy, designed to efficiently act on selected cancer cells. These targeted therapies are either monoclonal antibodies or monoclonal antibody-derived molecules that are designed to block oncogenic signaling pathways, such as MM-121, MM-111, MM-151 and MM-141, or nanotherapeutics, such as MM-398 and MM-302, that are designed to preferentially deliver cytotoxic therapies to the tumor tissue.

Program	Indication	Stage of Development	Commercial Rights
MM-398 (nanotherapeutic encapsulation of irinotecan)	Monotherapy and MM-398 plus fluorouracil, or 5-FU, and leucovorin in pancreatic cancer	Phase 3 ongoing (enrollment closed)	Merrimack worldwide, except Taiwan
	MM-398 plus 5-FU, leucovorin and bevacizumab in colorectal cancer*	Phase 2 ongoing (enrollment closed)	
	Monotherapy in pancreatic cancer	Phase 2 complete	
	Monotherapy in gastric cancer	Phase 2 complete	
	Monotherapy in glioma*	Phase 1 ongoing (enrolling)	
	MM-398 plus cyclophosphamide in pediatric solid tumors*	Phase 1 ongoing (enrolling)	
	Translational study in solid tumors	Phase 1 ongoing (enrollment closed)	
	Monotherapy in colorectal cancer	Phase 1 complete	
MM-121 (ErbB3 targeted monoclonal antibody)	MM-121 plus paclitaxel in platinum resistant/refractory ovarian cancer	Phase 2 ongoing (enrollment closed)	Sanofi worldwide; Merrimack holds option to co-promote in United States
	MM-121 plus exemestane in hormone receptor positive breast cancer	Phase 2 ongoing (enrollment closed)	
	MM-121 plus erlotinib in non-small cell lung cancer	Phase 2 ongoing (enrollment closed)	
	Neoadjuvant MM-121 plus paclitaxel in ErbB2 (HER2) negative breast cancer	Phase 2 ongoing (enrollment closed)	
	MM-121 plus paclitaxel in ErbB2 (HER2) negative breast, ovarian	Phase 1 ongoing (enrollment closed)	

and other gynecological cancers

MM-121 plus cetuximab and irinotecan in solid tumors	Phase 1 ongoing (enrollment closed)
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MM-121 plus multiple anti-cancer therapies in solid tumors	Phase 1 ongoing (enrollment closed)
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Monotherapy in solid tumors	Phase 1 complete
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Table of Contents

Program	Indication	Stage of Development	Commercial Rights
MM-111 (ErbB3 and ErbB2 (HER2) targeted bispecific antibody)	MM-111 plus paclitaxel and trastuzumab in gastric cancers	Phase 2 ongoing (enrolling)	Merrimack worldwide
	MM-111 plus multiple anti-cancer therapies in ErbB2 (HER2) positive solid tumors	Phase 1 ongoing (enrollment closed)	
	MM-111 plus trastuzumab in ErbB2 (HER2) positive breast cancer	Phase 1 complete	
	Monotherapy in ErbB2 (HER2) positive solid tumors	Phase 1 complete	
MM-302 (ErbB2 (HER2) targeted antibody drug conjugated liposomal doxorubicin)	Monotherapy and MM-302 plus trastuzumab with or without cyclophosphamide in ErbB2 (HER2) positive breast cancer	Phase 1 ongoing (enrolling)	Merrimack worldwide
MM-151 (EGFR (ErbB1) targeted oligoclonal antibody)	Monotherapy and MM-151 plus irinotecan in solid tumors	Phase 1 ongoing (enrolling)	Merrimack worldwide
MM-141 (IGF-1R and ErbB3 targeted tetravalent antibody)	Monotherapy and MM-141 plus everolimus, and MM-141 plus nab-paclitaxel and gemcitabine in various cancers	Phase 1 ongoing (enrolling)	Merrimack worldwide

* Investigator-sponsored

MM-398**MM-398 overview**

Our most advanced product candidate is MM-398. MM-398 is a novel, stable nanotherapeutic encapsulation, or enclosed sphere carrying an active drug, of the marketed chemotherapy drug irinotecan. MM-398 is designed to stably retain and protect irinotecan while in circulation in the body and enable efficient accumulation of the drug in solid tumors. Our Phase 3 clinical trial of MM-398 is focused on pancreatic cancer, although we believe that MM-398 may have potential uses in a number of other solid tumor indications, including colorectal cancer, lung cancer, breast cancer, glioma and pediatric solid tumors.

In July 2011, the FDA granted MM-398 orphan drug designation for the treatment of pancreatic cancer. In September 2011, the European Medicines Agency, or EMA, granted MM-398 orphan medicinal product designation for the treatment of pancreatic cancer. We are working to develop an imaging agent that can be used as a companion

diagnostic to identify the patient population likely to respond to treatment with MM-398. We are also conducting a translational study designed to identify predictive biomarkers associated with MM-398 for the purpose of estimating drug delivery to the tumor and patient response.

We are conducting a Phase 3 clinical trial of MM-398 in patients with metastatic pancreatic cancer whose cancer has progressed on treatment with the chemotherapy drug gemcitabine. MM-398 previously achieved its primary efficacy endpoints in two Phase 2 clinical trials, one in pancreatic cancer patients and one in gastric cancer patients. There are also several other ongoing Phase 1 and Phase 2 clinical trials of MM-398.

The encapsulated ingredient of MM-398, irinotecan, is a well-known and widely used chemotherapy. Irinotecan is a pro-drug of the active agent SN-38. SN-38 potently arrests cell growth by inhibiting topoisomerase 1, an enzyme involved in cell replication. Typically, free irinotecan is metabolized in the liver into SN-38, and from there SN-38 circulates throughout the body and is rapidly cleared. Dosing with free irinotecan, as with other chemotherapies, is limited by significant adverse effects and rapid clearance that, in turn, limit efficacy. In addition, as with other chemotherapies, the efficacy of irinotecan is limited by tumor resistance mechanisms.

Table of Contents

We believe that the nanotherapeutic encapsulation of irinotecan may offer a number of favorable attributes when compared to free irinotecan.

The encapsulation technology may prevent the premature metabolism of the active drug and thereby potentially reduce systemic exposure and increase the amount of active drug available to be delivered at the tumor site.

The specific size and stability characteristics of MM-398 are designed to enable the preferential deposition of the drug within tumors relative to normal tissue. Specifically, as a nanotherapeutic, MM-398 may be able to utilize the enhanced permeability and retention, or EPR, effect to selectively enter, and subsequently accumulate in, tumors with leaky vasculature.

MM-398 is designed for the irinotecan inside the molecule to be converted into SN-38 locally by tumor-resident macrophages, rather than being converted in the liver, as occurs with free irinotecan. We believe that MM-398 utilizes tumor macrophages to both break down the nanotherapeutic and convert the irinotecan into SN-38 in the local tumor environment, which may result in a sustained pool of SN-38 in the tumor. Overall, the design of MM-398 is intended to increase the local concentration of active drug so as to improve its anti-tumor effects.

Prior to May 2011, our collaborator, PharmaEngine, Inc., or PharmaEngine, led the clinical development of MM-398 under the designation PEP02. In May 2011, we entered into an agreement with PharmaEngine through which we now hold the development and commercialization rights to MM-398 worldwide, other than in Taiwan. As a result, we expect that we or third-party investigator sponsors will conduct all future clinical trials of MM-398.

The most advanced MM-398 clinical trial that we are conducting is our Phase 3 clinical trial for metastatic pancreatic cancer, which is described below. Also described below is the Phase 2 clinical trial that preceded this Phase 3 clinical trial. We are also collaborating with several investigators to conduct additional trials of MM-398, including an investigator-sponsored Phase 2 clinical trial in colorectal cancer, an investigator-sponsored Phase 1 clinical trial in glioma and an investigator-initiated Phase 1 clinical trial in pediatric solid tumors, which is being conducted under our investigational new drug application, or IND.

MM-398 Phase 3 clinical trial for metastatic pancreatic cancer

We are conducting a randomized, open label, controlled Phase 3 clinical trial of MM-398 in patients with metastatic pancreatic cancer whose cancer has progressed on treatment with gemcitabine. The trial is designed to compare the efficacy of MM-398, alone or in combination with 5-FU and leucovorin, against a common control arm of the combination of 5-FU and leucovorin, which is one of the drug combinations that clinicians use to treat patients with metastatic pancreatic cancer whose cancer progresses after treatment with gemcitabine. We completed enrollment of this trial in August 2013, enrolling 417 patients at 105 sites in North America, South America, Europe and Asia. The primary efficacy endpoint of this trial is a statistically significant difference in overall survival between MM-398 or the combination of MM-398 with 5-FU and leucovorin against the combination of 5-FU and leucovorin. Overall survival, or OS, is a measure of the time to death from treatment randomization. The secondary endpoints of this trial are objective response rate and progression free survival. Objective response rate, or ORR, is the sum of the complete response rate, which measures the disappearance of all target and non-target tumors, plus the partial response rate, which measures the overall tumor regression based on a decrease of a least 30% of the sum of measured tumor

diameters with no new tumors. Progression free survival, or PFS, is the time from the initiation of treatment to tumor progression based on an increase of at least 20% in the sum of measured tumor diameters with no new tumors. We expect to announce top line results from this trial in the second quarter of 2014.

MM-398 Phase 2 clinical trial for metastatic pancreatic cancer

MM-398 was evaluated in an open label, single arm Phase 2 clinical trial in 40 patients with metastatic pancreatic cancer whose cancer had progressed on treatment with gemcitabine. The trial was conducted by PharmaEngine at three sites, two in Taiwan and one at the University of California, San Francisco.

Table of Contents

The primary efficacy endpoint of this trial was the three month survival rate. The hypothesis was that, absent further therapies, 40% of the patients would survive three months. Success in this trial was defined as achieving a three month survival rate of 65%. The trial was successful, as 75% of patients survived three months or longer. The secondary efficacy endpoints in this trial were ORR, PFS and OS. The ORR was 7.5%, with three patients achieving an objective response, and an additional 17 patients (42.5%) demonstrating stable disease for a minimum of two treatment cycles. Stable disease, or SD, means neither a sufficient decrease nor increase in tumor size to qualify as either partial response or as progressive disease and no new tumors. Partial response, or PR, means an overall tumor regression based on a decrease of at least 30% in the sum of measured tumor diameters with no new tumors, and progressive disease, or PD, means a growth of at least 20% in the sum of measured tumor diameters or spread of the tumor since the beginning of treatment. The median PFS was 2.4 months, and median OS was 5.2 months. The most common severe adverse events included neutropenia, abdominal pain, asthenia, and diarrhea.

MM-398 companion diagnostic development

We believe that deposition of nanotherapeutics such as MM-398 in the tumor may be important to efficacy. We are exploring development of *in vivo* companion diagnostics that take the form of imaging agents that may help identify patients likely to benefit from nanotherapeutics by enabling the measurement of deposition in patient tumors and excluding those patients with low deposition whose tumors are therefore unlikely to respond to treatment with a nanotherapeutic. We are currently evaluating nanotherapeutic formulations of various agents imaged by PET/CT scan and other modalities to assess the potential for measuring deposition. We are conducting a Phase 1 translational study at one site in the United States designed to test the feasibility of an MRI-based approach to assess large-particle delivery and tumor macrophage uptake using a marketed iron supplement as an imaging agent and to identify predictive biomarkers associated with MM-398 in various cancers. As part of our preclinical and clinical translational research, we are also investigating functional *in vitro* biomarkers that may be predictive of efficacy in poorly vascularized tumors, such as pancreatic cancer.

MM-121***MM-121 overview***

MM-121 is a fully human monoclonal antibody that targets the ErbB3 cell surface receptor. An antibody is a type of protein normally produced by cells of the immune system that binds to just one epitope, or chemical structure, on a protein or other molecule. MM-121 was designed to inhibit cancer growth directly, restore a tumor's sensitivity to drugs to which it has become resistant, and delay the development of resistance by a tumor to other agents.

We have established a worldwide collaboration with Sanofi for the development and commercialization of MM-121. In collaboration with Sanofi, we are conducting a research and development program to evaluate MM-121 in multiple Phase 1 and Phase 2 clinical trials in combination with both chemotherapies and other targeted agents across a wide spectrum of solid tumor patient populations, including patients with ovarian, breast and lung cancers. The goal of our MM-121 clinical program is to explore the efficacy and safety of MM-121 in combination with other targeted ErbB agents such as erlotinib, chemotherapies such as paclitaxel, and anti-hormonal agents such as exemestane. We have sought to assess whether efficacy is improved by measuring the ability of various MM-121 combinations to enhance anti-tumor activity or to delay resistance or restore sensitivity to the other therapies.

Research suggests that ErbB3 signaling is often critical to the growth and survival of tumors, and that the use of ErbB3 signaling as a resistance mechanism by cancer cells to a variety of cancer therapies often occurs across patient populations and tumor types. Therefore, we believe that MM-121 may be effective when given in combination with chemotherapies and other targeted therapies, and potentially offers the following advantages compared to existing

therapies:

the ability to synergistically or additively inhibit tumor growth, based on our preclinical research involving a broad range of combination therapies;

Table of Contents

the ability to delay the development of resistance to other agents, based on research by us and others demonstrating that ErbB3 signaling is upregulated in response to treatment with other therapies; and

the ability to restore sensitivity to drugs, based on our preclinical research involving several cell types and xenograft models that are resistant to targeted therapies or chemotherapies.

Based on the central role of ErbB3 in cancer growth and survival, we believe that MM-121 may be applicable to a broad range of tumors, including lung, prostate, breast, ovarian, colon and pancreatic cancers. Our preliminary study of several hundred tumor samples suggests that MM-121 may be able to target ErbB3 signaling that is relevant in approximately 30% or more of cancer patients with these types of tumors, and top line data from our Phase 2 clinical trials in breast and ovarian cancers appear to support this hypothesis.

MM-121 Phase 2 clinical trials

We announced top line results in 2013 from several of our Phase 2 clinical trials as described below.

Phase 2 clinical trial of MM-121 in combination with paclitaxel for platinum resistant or refractory advanced ovarian cancer

In October 2013, we announced top line results of our randomized, open label Phase 2 clinical trial of MM-121 in combination with paclitaxel in patients with advanced ovarian cancer who are resistant or refractory to treatment with platinum-based chemotherapies, which are frequently used to treat ovarian cancer. Two hundred twenty three patients were enrolled in this trial at multiple sites in North America and Europe. Patients were randomized (2:1) to receive MM-121 plus paclitaxel or paclitaxel alone. The primary objective was to compare PFS between the groups. Pretreatment biopsies obtained from all patients were analyzed to assess a pre-specified set of biomarkers mechanistically linked to ErbB3 signaling. The hazard ratio, or HR, for PFS in the overall study population was 1.0 [95% CI 0.74 – 1.4], which did not meet the primary endpoint for PFS. The HR for PFS is a measurement of the chance of disease progression for the treatment arm relative to the control arm, with an HR of less than one indicating that a patient will likely progress less quickly on the treatment arm than on the control arm, and an HR of more than one indicating the opposite. Because a trial represents a sample of a much larger population, the reported HR from a trial is an estimate of the true HR. The confidence interval, or CI, given after the HR reflects the amount of certainty in the estimate of the HR. An HR value that is not contained within a 95% confidence interval is unlikely to be the true HR. A sub-population of patients was identified using two of the pre-specified set of biomarkers. Those biomarker positive patients (34%: 57/169 patients with biomarkers available) had an HR for PFS of 0.37 [95% CI 0.2 – 0.8]. The HR for PFS in the biomarker negative population was 1.54 [95% CI 1.0 – 2.4]. The overall safety profile was consistent with expected adverse events, with the exception of an increase in the pulmonary embolism rate (5.0% on the treatment arm vs. 1.2% on the control arm). However, the overall rate of venous thromboembolic events was comparable (5.7% vs. 7.5%). An overall increase in all grades (Grades 1, 2, 3 and 4) of gastrointestinal toxicities, including diarrhea (73.6% vs. 42.5%), vomiting (31.4% vs. 18.8%) and other mucosal toxicities such as rhinitis (7.1% vs. 1.3%), epistaxis (23.6% vs. 17.5%), stomatitis (22.1% vs. 10.0%) and mucosal inflammation (22.1% vs. 1.3%), were observed in the combination as compared to paclitaxel alone, the majority of which were mild to moderate in severity.

Phase 2 clinical trial of MM-121 in combination with exemestane for hormone receptor positive breast cancer

We announced top line results in November 2013 from our randomized, double blind, placebo-controlled Phase 2 clinical trial that studied whether the combination of MM-121 and exemestane was more effective in prolonging PFS than exemestane in ER/PR+ metastatic breast cancer patients who have previously failed anti-estrogen therapy. Exemestane is a widely used aromatase inhibitor for the treatment of breast cancer. Aromatase is an enzyme

implicated in breast cancer since it is involved in the synthesis of estrogen. 118 postmenopausal women with metastatic hormone receptor positive breast cancer who tested negative for overexpression of ErbB2 (HER2) and whose cancer progressed on treatment with another aromatase inhibitor or other anti-estrogen therapy were enrolled at multiple sites in North America and Europe. The HR for PFS in the overall study population was 0.772 [95% CI 0.496-1.201], which did not meet the primary endpoint of the study (HR < 0.5).

Table of Contents

Analysis of a pre-specified set of biomarkers mechanistically linked to ErbB3 signaling and consistent with the pre-specified set of biomarkers analyzed in the Phase 2 clinical trial of MM-121 in ovarian cancer revealed a subpopulation of patients (31% of the 55 biomarker-evaluable patients) in which the observed HR for PFS was 0.32 [95% CI 0.10 – 1.0]. The HR for PFS in the biomarker negative population was 0.89 [95% CI 0.44 – 1.79]. Overall, similar frequencies were reported for adverse events of any grade (Grades 1, 2, 3 and 4) between the treatment and control arms, with no unexpected toxicities experienced and no increase in serious adverse events (Grade 3 or worse events 25.0% on the treatment arm vs. 25.4% on the control arm). Increased frequencies for individual adverse events of all grades (Grades 1, 2, 3 and 4) on the treatment arm were reported for diarrhea (50.0% vs. 23.7%), mucosal inflammation (16.1% vs. 3.4%) and decreased appetite (16.1% vs. 8.5%). Most adverse events were mild-to-moderate in severity. There were no pulmonary embolisms or other venous thromboembolic events reported in either arm.

Phase 1/2 clinical trial of MM-121 in combination with erlotinib for non-small cell lung cancer

We have concluded a Phase 1/2 clinical trial of MM-121 in patients with metastatic non-small cell lung cancer. The Phase 1 portion of the trial was an open label, dose escalation study in which successive groups of patients were enrolled. The purpose of the Phase 1 portion of the trial was to assess the safety of MM-121 in combination with erlotinib and determine the optimal dose and dosing schedule of this combination for the Phase 2 portion of the trial. Erlotinib is a marketed small molecule directed at the epidermal growth factor receptor, or EGFR. EGFR is also known as ErbB1. 32 patients were enrolled in the Phase 1 portion of the trial. Clinical activity observed in this trial included one patient with a PR and 14 patients with SD. The most common toxicities observed of any grade (Grades 1, 2, 3 and 4) were diarrhea (82%), rash (64%) and fatigue (64%). Consistent with the design of this Phase 1 clinical trial to principally test for safety and dosage tolerance, this trial was not designed to test for statistical significance of anti-tumor activity.

The Phase 2 portion of the trial tested three separate hypotheses in three different populations of non-small cell lung cancer patients, at multiple sites in North America, Europe and Asia. The Phase 2 portion of the trial was an open label study which enrolled 229 patients across the three different patient populations. The primary efficacy endpoint of the Phase 2 portion of the trial was PFS. Three populations of non-small cell lung cancer patients were enrolled:

Group A: patients whose tumors did not have an EGFR (ErbB1) activating mutation, whose cancer had recurred or progressed following at least one chemotherapy-containing regimen and who had not received prior EGFR (ErbB1) targeted therapy were randomized (2:1) to receive either MM-121 in combination with erlotinib or erlotinib alone;

Group B: patients whose tumors had an EGFR (ErbB1) activating mutation and who had not received prior EGFR (ErbB1) targeted therapy were randomized (2:1) to receive either MM-121 in combination with erlotinib or erlotinib alone; and

Group C: patients whose tumors had responded to an EGFR (ErbB1) targeted therapy and subsequently acquired resistance received MM-121 in combination with erlotinib. All patients received MM-121 in this group.

In 2013, we disclosed that Group C failed to meet its primary endpoint, the second cohort (Group A) did not pass an interim analysis and did not meet its primary endpoint, and the third cohort (Group B) did not pass its interim analysis. No further patients were enrolled in the Group B cohort. Translational analysis of biopsies is ongoing.

Phase 2 neoadjuvant clinical trial of MM-121 in combination with paclitaxel for ErbB2 (HER2) negative breast cancer

We are currently conducting a randomized, open label Phase 2 neoadjuvant clinical trial of MM-121 in combination with paclitaxel, an established chemotherapy, in patients with ErbB2 (HER2) negative breast cancer. The primary efficacy endpoint of this trial is pathologic complete response, or pCR, rate at time of

Table of Contents

surgery. pCR measures the absence of invasive cancer in breast and lymph node tissue following neoadjuvant therapy. We have completed enrollment in this trial, enrolling 200 patients in parallel across the following two populations of ErbB2 (HER2) negative breast cancer patients:

Group A: patients whose tumors are estrogen receptor, or ER, positive and ErbB2 (HER2) negative and have not undergone prior treatment or surgery; and

Group B: patients whose tumors are ER negative, ErbB2 (HER2) negative and progesterone receptor negative, often referred to as triple negative breast cancer, and have not undergone prior treatment or surgery.

Each population of patients is randomized (2:1) to receive either MM-121 in combination with paclitaxel or paclitaxel alone. Following treatment with MM-121 and/or paclitaxel, patients will receive standard treatment with doxorubicin and cyclophosphamide, two marketed chemotherapies, prior to surgical resection.

In November 2013, we announced results from the Group A population of this trial. Patients in the treatment arm who received the combination of MM-121 and paclitaxel achieved a pCR rate of 10.8% [95% CI 5.3 – 20.6] compared to a pCR rate of 3.3% [95% CI 0.6 – 16.7] for those in the control arm. There was no formal quantitative endpoint specified for this study. Translational analysis is ongoing based on serial biopsies.

The trial in the Group B population is ongoing, and we expect to announce top line results in the second quarter of 2014.

MM-121 companion diagnostic development

We are developing a companion diagnostic that is focused on measuring certain mechanistically related biomarkers to determine whether a tumor is dependent on ErbB3 signaling and therefore amenable to treatment with MM-121. In our animal models, measurements of the levels of five proteins involved in the ErbB pathways predict the activated state of ErbB3 and, therefore, the potential responsiveness of the tumor to MM-121 based on those levels. Using this approach, we have been able to predict whether tumors in preclinical xenograft studies will respond to MM-121. As part of our ongoing clinical development of MM-121, we are measuring the same set of biomarkers in patient biopsies in order to determine if biomarker levels correlate with patient outcome in both treatment and control arms. Results from our Phase 2 clinical trial of MM-121 in combination with exemestane for hormone receptor positive breast cancer and our Phase 2 clinical trial of MM-121 in combination with paclitaxel for platinum resistant or refractory advanced ovarian cancer suggest that analysis of these five pre-specified biomarkers, and in particular two of those biomarkers, may potentially be predictive of patient response to MM-121 when used in the combination setting. We expect to announce additional biomarker data from our Phase 2 clinical trials of MM-121 in the second quarter of 2014.

MM-111

MM-111 overview

MM-111 is a bispecific antibody designed to inhibit ErbB3 signaling in cancer cells that are characterized by overexpression of the ErbB2 (HER2) cell surface receptor. A bispecific antibody is a type of antibody that is able to bind simultaneously to two distinct target cell proteins or receptors. In the case of MM-111, these targets are the

ErbB2 (HER2) receptor and the ErbB3 receptor. Our research and that of others suggest that the ErbB2 (HER2) receptor triggers tumor growth and survival when it binds together with the ErbB3 receptor and another protein called heregulin. MM-111 is designed to anchor to both receptors, ErbB2 (HER2) and HER3, on the cell surface and block heregulin's ability to transmit tumor growth signals, thus inhibiting the tumor cell's ability to thrive. We believe that MM-111 may be potentially applicable across a broad range of solid tumors.

We are conducting a clinical program to evaluate MM-111 as a monotherapy and in combination with a range of therapies across ErbB2 (HER2) positive solid tumors, including gastric, esophageal, gastroesophageal junction, breast, ovarian and bladder cancers. In August 2013, we obtained orphan drug designation in the United States for MM-111 for the treatment of gastric, esophageal and gastroesophageal junction cancers.

Table of Contents

Based on our preclinical research, we believe that MM-111 may offer the following advantages compared to existing treatments:

In patients with ErbB2 (HER2) positive cancers, the bispecific design of MM-111 may more effectively inhibit ErbB3 than combinations of separate ErbB2 (HER2) and ErbB3 targeted antibodies. Multiple published studies indicate that the affinity of heregulin for the ErbB2 (HER2)/ErbB3 receptor complex on ErbB2 (HER2) positive tumor cells is very high. Our research suggests that this makes it difficult for a single monoclonal antibody or a combination to inhibit ErbB3 signaling in patients that express high levels of ErbB2 (HER2). MM-111 is designed to utilize an ErbB2 (HER2) targeting arm to greatly increase the local concentration of the ErbB3 therapeutic arm on the surface of ErbB2 (HER2) positive tumor cells, thus enabling the molecule to disrupt the high affinity complex and inhibit signaling.

We believe that MM-111 may be particularly effective in combination with both ErbB2 (HER2) targeted and conventional chemotherapies, as MM-111 may be able to enhance anti-tumor activity, delay the development of resistance to other agents and restore sensitivity to drugs to which a tumor has become resistant.

In breast cancer and additional tumor types, such as gastric and ovarian cancer, MM-111 may be effective in patients whose tumors express ErbB2 (HER2) at lower levels than those needed for currently marketed ErbB2 (HER2) targeted agents that inhibit the ErbB2 (HER2) receptor directly.

We believe that MM-111 will have a more favorable safety profile than currently marketed ErbB2 (HER2) targeting agents because it is not designed to block ErbB2 (HER2) cell signaling, which is associated with cardiac adverse events.

MM-111 Phase 2 clinical trial

In June 2013, we enrolled our first patient in a Phase 2 clinical trial of MM-111 for the treatment of advanced gastric, esophageal and gastroesophageal junction cancers. Overexpression of the ErbB2 (HER2) cell surface receptor has been reported in 7%–34% of gastric cancers. This Phase 2 clinical trial is designed to evaluate whether MM-111 is effective in gastric, esophageal and gastroesophageal junction cancer patients overexpressing the ErbB2 (HER2) receptor. The clinical trial is enrolling patients who would traditionally receive trastuzumab-based therapy due to their ErbB2 (HER2) score of 3+ on the HercepTest®, or their ErbB2 (HER2) score of 2+ on the HercepTest® and their positive FISH status (FISH-positive). These patients will be randomized to receive either MM-111 in combination with paclitaxel and trastuzumab or paclitaxel and trastuzumab. The two independent primary objectives for this clinical trial are first, to assess PFS between the treatment and control arms in the overall trial population, and second, to assess PFS between the treatment and control arms within the subset of patients expressing high levels of heregulin in archived tumor samples.

MM-111 companion diagnostic development

We are working to develop a diagnostic tool that will allow rapid identification of patients likely to respond to treatment with MM-111 based on their expression levels of certain biomarkers. The current focus of this program is the development of assays to quantify heregulin in patient samples from our clinical trials. We are testing additional

quantitative assays for other biomarkers in archived and pretreatment patient biopsies from our clinical trials to generate data to support our biomarker hypotheses. This diagnostic is in preclinical development.

MM-302

MM-302 overview

MM-302 is an antibody drug conjugated liposomal doxorubicin that targets the ErbB2 (HER2) receptor. Doxorubicin is a marketed chemotherapy that is a member of the anthracycline class of chemotherapies. The addition of anthracyclines to the treatment of both solid and liquid tumors has historically improved outcomes for patients and, specifically, has been an effective component of breast cancer treatment for decades, with free doxorubicin-based regimens providing consistent clinical benefit. However, significant adverse events, including

Table of Contents

acute and chronic heart dysfunction, have limited their use. These cardiotoxic effects limit the use of traditional anthracyclines in combination with targeted therapies, such as trastuzumab, for treatment of ErbB2 (HER2)-positive breast cancer. Liposomal doxorubicin (Doxil[®]), which has been shown to reduce cardiotoxicity associated with free doxorubicin, has been approved for use in certain settings, but has not been approved for use in the United States for the treatment of breast cancer. We designed MM-302 to target and bind to cancer cells that overexpress ErbB2 (HER2) and thereby release doxorubicin at the site of the tumor, while minimizing uptake into normal cells, including those of the heart.

We believe that MM-302 may offer advantages in comparison with other forms of doxorubicin, namely free doxorubicin and liposomal doxorubicin. Our clinical development strategy is to demonstrate that MM-302 has favorable efficacy and safety compared to doxorubicin for the treatment of metastatic breast cancer where concerns over cardiac safety, particularly in combination with trastuzumab, have led to a decline in the use of anthracyclines despite proven efficacy:

MM-302 is designed to utilize nanotherapeutic encapsulation to protect the heart from cardiac adverse events associated with free doxorubicin.

The specific size and stability characteristics of MM-302 are designed to enable the preferential deposition of the drug within tumors relative to normal tissue. Specifically, as a nanotherapeutic, MM-302 may be able to utilize the EPR effect to selectively enter, and subsequently accumulate in, tumors with leaky vasculature.

MM-302 is designed with attached antibodies so as to use the ErbB2 (HER2) receptor as a binding mechanism to induce the internalization of the nanotherapeutic encapsulated drug particle, and thereby provide drug delivery directly into the cell and increase the potential efficacy of doxorubicin.

MM-302 is designed with an ErbB2 (HER2) antibody that binds to but does not shut down the signaling activity of ErbB2 (HER2). This may minimize the severity and frequency of adverse events associated with suppressing ErbB2 (HER2) and allow for more clinical benefit for patients with lower levels of ErbB2 (HER2) than is provided by current ErbB2 (HER2) directed treatments.

MM-302 may provide anti-tumor benefit for patients who have failed other ErbB2 (HER2) targeted therapies, but who have not been exposed to anthracyclines.

Our preclinical research shows that, in animal models, MM-302 may synergize with a number of approved therapies, such as trastuzumab, chemotherapies and our own drugs, like MM-111. The current concerns about the severity and frequency of adverse events associated with doxorubicin and liposomal doxorubicin prevent them from being used in many combination regimens.

MM-302 Phase 1 clinical trial

We recently presented results from our ongoing Phase 1 clinical trial of MM-302 in patients with advanced ErbB2 (HER2)-positive breast cancer. The purpose of this trial is to assess the safety of MM-302 and identify the maximum

tolerated dose. We reported on 47 patients enrolled in this clinical trial. MM-302 appeared to be well tolerated in ErbB2 (HER2)-positive metastatic breast cancer patients. Patients treated with MM-302 showed no signs of clinical decline in cardiac function. The most common adverse events were fatigue, nausea and decreased appetite; the rates of these events were consistent across MM-302 as a monotherapy and in combination with trastuzumab. Neutropenia was the most common Grade 3/4 adverse event, occurring in seven patients (six in the monotherapy arms and one in the combination arm). One dose limiting toxicity was observed (febrile neutropenia), and the dose was subsequently withheld; the patient went on to continue study treatment for three additional cycles. Results from the trial also showed that patients treated with MM-302 as a monotherapy at doses of 30, 40 and 50 mg/m² once every four weeks had an estimated PFS of 5.6 months [95% CI 2.8 – 10.9] and a clinical benefit response rate of 37%. Stronger MM-302 activity was observed in patients not previously exposed to anthracyclines; of nine anthracycline-naïve patients treated with MM-302 as a monotherapy, five had a PFS of nine months or more. Consistent with the design of this Phase 1 clinical trial to principally test for safety and dosage tolerance, it was not designed to test for statistical significance of anti-tumor activity.

Table of Contents

We anticipate initiating a Phase 2 clinical trial of MM-302 in patients with ErbB2 (HER2)-positive breast cancer in 2014.

MM-302 companion diagnostic development

We believe that deposition of nanotherapeutics such as MM-302 in the tumor may be important to efficacy. We are exploring development of *in vivo* companion diagnostics that take the form of imaging agents that may help identify patients likely to benefit from nanotherapeutics by enabling the measurement of deposition in patient tumors and excluding those patients with low deposition whose tumors are therefore unlikely to respond to treatment with a nanotherapeutic. We are currently evaluating nanotherapeutic formulations of various agents imaged by PET/CT scan and other modalities to assess the potential for measuring deposition.

MM-151

MM-151 overview

MM-151 is an oligoclonal therapeutic consisting of a mixture of three fully human monoclonal antibodies designed to bind to non-overlapping epitopes of EGFR (ErbB1). An oligoclonal therapeutic is a mixture of two or more distinct monoclonal antibodies. EGFR (ErbB1) has long been recognized as an important drug target in several malignancies, including lung, breast, colon, pancreatic and head and neck cancers. We are conducting a Phase 1 clinical trial of MM-151 in patients with refractory solid tumors.

Based on our preclinical research, we believe that MM-151 may offer the following advantages over other EGFR (ErbB1) inhibitors:

MM-151 is designed to block the signal amplification that our research suggests occurs in the EGFR (ErbB1) pathway. Binding to multiple epitopes of EGFR (ErbB1) may result in superior signal inhibition compared to currently marketed EGFR (ErbB1) therapies, which only bind to one epitope.

MM-151 is designed to inhibit the signaling that results from the binding of a full range of EGFR (ErbB1) ligands. In contrast, currently marketed therapies block the signaling of only a subset of these ligands. As a result, a broader patient population may derive clinical benefit from MM-151.

Tumors treated with marketed monoclonal antibodies directed at EGFR (ErbB1), such as cetuximab and panitumumab, often develop resistance to these therapies. We hypothesize that this resistance often results from the production by the tumor of a different type of ligand that binds to EGFR (ErbB1). Because MM-151 is designed to block a full range of EGFR (ErbB1) ligands, resistance to treatment with MM-151 may be delayed or reduced compared to existing therapies.

We believe that there may be the potential to expand MM-151 into indications in which targeted EGFR (ErbB1) therapies are not currently approved, but which our preclinical research indicates should contain patients who will respond to these therapies. Potential indications include lung cancer, triple negative breast cancer and colorectal cancer.

MM-151 Phase 1 clinical trial

We are conducting a Phase 1 clinical trial of MM-151 as a monotherapy and in combination with irinotecan in patients with solid tumors. The Phase 1 clinical trial will assess the safety of MM-151 and determine the recommended Phase 2 dose. Four sites are participating in this trial.

We anticipate initiating a Phase 2 clinical trial of MM-151 in 2014.

MM-151 companion diagnostic development

We are focusing our diagnostic efforts for MM-151 on the identification of key biomarkers that will indicate which patient populations are likely to benefit from MM-151 treatment.

Table of Contents

MM-141

MM-141 overview

MM-141 is a fully human tetravalent bispecific antibody designed to inhibit signaling of the PI3K/AKT/mTOR pathway initiated by the insulin-like growth factor 1 receptor, or IGF-1R, and ErbB3 cell surface receptors. A tetravalent bispecific antibody is a single molecule that has four binding sites, two for each of two different target cell surface receptors. PI3K/AKT/mTOR signaling is often activated in cancers in response to stress induced by chemotherapies or targeted anti-cancer medicines and is believed to play a significant role in promoting tumor cell survival. We are conducting a Phase 1 clinical trial of MM-141 as a monotherapy and in a combination therapy setting in patients with solid tumors.

We designed MM-141 to suppress the PI3K/AKT/mTOR signaling pathway by reducing the levels of IGF-1R and ErbB3 receptor complexes that trigger the pathway. Based on our preclinical research, we believe that MM-141 may offer the following advantages compared to antibodies that solely target IGF-1R or ErbB3:

MM-141 is a tetravalent antibody that binds to both IGF-1R and ErbB3 with high affinity and avidity.

MM-141 is designed to block pro-survival signaling of major activators of PI3K/AKT/mTOR, such as heregulin, IGF-1 and IGF-2.

MM-141 is designed to block mutual compensation in IGF-1R and ErbB3 mediated activation of PI3K/AKT/mTOR by co-inhibiting both targets.

MM-141 is designed to degrade IGF-1R and ErbB3 containing receptor complexes that are commonly activated in tumors in response to PI3K/AKT/mTOR inhibition by a small molecule or an antibody.

MM-141 appears not to activate the immune system, which reduces the chance of off-target adverse events.

MM-141 Phase 1 clinical trial

We are conducting a Phase 1 clinical trial of MM-141 in both a monotherapy and a combination therapy setting in patients with solid tumors. This is a Phase 1 dose-escalation study evaluating safety and tolerability and pharmacokinetic and pharmacodynamic properties of MM-141 as a monotherapy and in combination with everolimus or with nab-paclitaxel and gemcitabine. The purpose of this trial is to assess the safety of MM-141 and identify the recommended Phase 2 dose. The monotherapy portion of this Phase 1 clinical trial has been completed.

We anticipate initiating a Phase 2 clinical trial of MM-141 in 2014.

MM-141 companion diagnostic development

We are conducting research and development on an *in vitro* companion diagnostic for MM-141 that will help to determine which patients will derive benefits from the drug alone or in combination with other therapies, while

experiencing a satisfactory safety profile. This research is focused on identifying pathway-relevant biomarkers and assessing their correlation with the magnitude of patient response to MM-141.

Preclinical Product Candidates

We are developing our preclinical product candidates for a range of solid tumor indications. Our most advanced preclinical candidates are MM-310, a targeted nanotherapeutic, and MM-131, a multispecific antibody.

Network Biology

Network Biology is what we call our proprietary systems biology-based approach to biomedical research. The goal of Network Biology is to understand how the complex molecular interactions that occur within cell

Table of Contents

signaling pathways, or networks, regulate cell decisions and how network dysfunction leads to disease. This platform utilizes proprietary, dynamic biological data generated in a high-throughput method in which we test multiple biological or chemical parameters using engineering, analytical and modeling expertise, and from which we build computational models of cell biology to further our drug discovery, design and predictive development. To execute Network Biology, we have developed an expertise in generating kinetic data, describing molecular changes or interactions over time, to illuminate the dynamic interactions that occur within biological systems. We apply Network Biology throughout the research and development process, including for target identification, lead compound design and optimization, diagnostic discovery, *in vitro* and *in vivo* predictive development and the design of clinical trial protocols.

Our models are constructed and validated using internally generated and proprietary data sets. Following the validation of a comprehensive model of a cell signaling network, we are able to use the model for drug discovery. Contrary to traditional methods, our discovery work takes place *in silico*, or using the model for simulation. We believe that this approach is more efficient and productive for drug discovery and development than traditional approaches.

As one example, we identified ErbB3, the target of MM-121, using our proprietary model of the ErbB signaling network after conducting a sensitivity analysis on its signaling process. Although the ErbB pathway has been extensively targeted by cancer therapeutics, we believe that understanding the relative importance of the different components of the ErbB network is central to identifying an attractive drug target and a therapeutic directed at this target. In this case, we built a computational model of the ErbB signaling network that includes the most potent ErbB receptor ligands, as well as known and novel ErbB inhibitors. We populated the model with proprietary dynamic data that we generated from our experiments. The model describes in mathematical equations 700 biochemical reactions representing the ErbB signal transduction network, and identified ErbB3 as the key node in response to both ErbB3- and EGFR (ErbB1)-binding ligands. We then used this insight to develop MM-121.

Ultimately, we believe that Network Biology will result in better treatments for complex diseases by providing broader insight into disease and the potential therapeutic alternatives for physicians and patients. Using Network Biology, we are incorporating the identification of biomarkers and the development of companion diagnostics into the drug development process. We believe that integrated medicines may enable physicians to deliver the right drug to the right set of patients at the right time. This may improve patient outcomes by providing improved therapeutics along with the diagnostic information to guide physician treatment decisions, reduce the overall costs of treating and caring for cancer patients, and provide a basis for seeking favorable reimbursement of approved drugs from payors because of the benefits to patients.

In addition to improving patient care, we believe that Network Biology can increase the productivity of biomedical research, increase the probability of approval for new drugs and produce more precisely targeted therapeutics. We believe that our therapeutic oncology product candidates will have a greater probability of success than product candidates based on conventional drug development because Network Biology provides us with:

a multidisciplinary, integrated approach to understanding complex biology;

simulation and modeling capabilities that aid in the efficiency and productivity of development; and

the capability to design and build a broad range of therapeutic product candidates without being limited to a particular drug design technology or target class.

Although our initial focus is oncology, we believe that our Network Biology approach is applicable to a broad range of therapeutic areas beyond cancer, including bone and joint conditions, infectious disease, inflammation, central nervous system disease and other areas of medicine with high unmet needs. While we may pursue some of these disease areas directly ourselves, because of the potential of very broad applicability of our Network Biology approach, our plan is to pursue many or all of these other areas through collaborations, licenses

Table of Contents

and other arrangements with third parties. As an example, in 2010, we established Silver Creek Pharmaceuticals, Inc., or Silver Creek, to apply our Network Biology approach to the research, development and commercialization of pharmaceuticals in the regenerative medicine field. Silver Creek is now a majority owned subsidiary of ours with the minority equity held by third-party investors.

Therapeutic Design Capabilities

We apply the insights about cell signaling dynamics that we gain from Network Biology across a range of therapeutic technologies to design drug candidates that we believe can be efficiently delivered to the selected molecular target. We believe that the best therapies for the oncology indications that we are pursuing are targeted therapies that, in contrast with conventional chemotherapies, are highly selective for the molecular mechanisms that we are seeking to affect and, as a result, offer the potential for significant efficacy and safety benefits. Two such targeted therapies are human monoclonal antibodies and nanotherapeutics.

Human monoclonal antibodies

Human monoclonal antibodies are a key component of many of our targeted therapies based on their range of favorable attributes, including their significant target specificity and avidity relative to small molecules and their well understood pharmacokinetic properties. We have designed antibodies for use as stand-alone therapeutics and have incorporated antibodies into other therapeutics, such as targeted nanotherapeutics, as targeting or docking agents. We work with several antibody formats, including the following:

Fully human recombinant monoclonal antibodies and fragments of fully human recombinant monoclonal antibodies that include the antibody binding domain. Monoclonal antibodies and antibody fragments are proteins that bind specifically to one defined site on a cell surface protein or receptor.

Multispecific antibody formats, which are comprised of two or more antibodies or antibody fragments linked to a common scaffold molecule to produce a single molecule that specifically binds to distinct epitopes on two or more target cell surface proteins or receptors.

Oligoclonal antibody mixtures, which are comprised of defined ratios of two or more recombinant human monoclonal antibodies that target two or more distinct epitopes on a single cell surface protein or receptor.

Nanotherapeutics

Our nanotherapeutics are lipidic particles carefully constructed to encapsulate active drug payloads. Nanoscale objects typically, though not exclusively, have dimensions on the order of 100 nanometers or smaller. We believe that nanotherapeutics offer the following potentially favorable attributes:

The uniform sizing of our nanotherapeutics is intended to enable targeting and preferential deposition within tumors by taking advantage of the EPR effect.

We formulate our nanotherapeutics to minimize the leakage of active drug payload out of the particle before the nanotherapeutic has reached the tumor, with the goal of limiting systemic exposure, and the associated occurrence of adverse events, and maximizing the amount of active drug that reaches the target.

Encapsulation is designed to protect the active drug payload as it passes through the circulation and organs of the body, such as the liver, preventing premature clearance or metabolism of the active drug, and thereby extend the pharmacokinetic profile and enable more convenient dosing regimens.

We can efficiently create targeted nanotherapeutics using our technical expertise and know-how that enable insertion of targeting agents, such as antibodies, into our nanotherapeutics.

We can customize our nanotherapeutics for use with a variety of drug payloads, including chemotherapies, cytotoxics and nucleic acids, such as siRNA and genes.

Table of Contents

Manufacturing

We manufacture drug substance for use in our clinical trials and research and development efforts for all of our therapeutic product candidates using current good manufacturing practices, or cGMP, at our approximately 13,500 square foot multi-product facility located at our corporate headquarters in Cambridge, Massachusetts. We have the capabilities to manufacture antibodies, nanotherapeutics and antibody-targeted nanotherapeutics.

Our manufacturing facility is comprised of multiple independent clean rooms, includes three 1,000 liter single-use bioreactors, and has capacity to produce approximately 50 kilograms of antibodies per year. As of January 31, 2014, we employed approximately 84 employees in manufacturing activities.

We believe that our strategic investment in manufacturing capabilities allows us to advance product candidates at a more rapid pace and with more flexibility than a contract manufacturer, produce drug substance in a cost-effective manner while retaining control over the process and prioritize the timing of internal programs.

Our manufacturing capabilities encompass the full manufacturing process through quality control and quality assurance and are integrated with our project teams from discovery through development. This structure enables us to efficiently transfer research stage lead molecules into manufacturing. We have designed our manufacturing facility and processes to provide maximum flexibility and rapid changeover for the manufacture of different product candidates. We outsource fill-finish, packaging, labeling and shipping.

We manufacture our antibody and nanotherapeutic product candidates using commercially available raw materials and well established manufacturing procedures. We produce antibodies in bioreactors using Chinese hamster ovary cells that have been genetically engineered to secrete our antibody. We then purify the antibodies using industry standard methods, which include affinity chromatography and ultrafiltration operations. We produce nanotherapeutics using high pressure filter extrusion of a mixture of cholesterol and lipids. We then load the nanoliposomes with active pharmaceutical ingredient using a proprietary process.

We have optimized the Phase 2 production process of MM-398 and produced material for our Phase 3 clinical trial at our manufacturing facility. We filed a chemistry manufacturing and controls amendment with the FDA in October 2011 and are currently using the MM-398 product that we manufactured for our Phase 3 clinical trial.

We believe that we can scale our manufacturing processes to support our clinical development programs and the potential commercialization of our product candidates. If any of our product candidates are approved for marketing by the FDA or any other regulatory agency, we intend to oversee the manufacturing of these products, other than MM-121, which Sanofi now manufactures according to the terms of our collaboration agreement.

For our antibody product candidates, we intend to continue to manufacture drug substance for preclinical testing and Phase 1 and Phase 2 clinical development at our current facility. Our long term plan is to establish our own facilities for manufacturing antibody drug substance for Phase 3 clinical development and commercial sale. Pending our establishment of these facilities, we expect to transfer Phase 3 and commercial antibody manufacturing to a contract manufacturing organization. For our nanotherapeutic product candidates, we intend to continue to manufacture drug substance for preclinical testing and all stages of clinical development and initially manufacture drug substance for commercial sale at our current facility.

We are developing and testing diagnostic assays for predictive biomarkers in an internal laboratory under Good Clinical Laboratory Practices. Upon completion of the development of the diagnostic tests, we plan to evaluate external as well as internal options for manufacturing and commercialization of the tests.

We are leveraging our manufacturing capabilities to manufacture drug product on behalf of a third-party pharmaceutical company, and may enter into additional agreements to do so in the future. In November 2013, we entered into an agreement with Watson Laboratories, Inc., or Actavis, as more fully described below, pursuant to

Table of Contents

which we will utilize our nanoliposomal manufacturing capabilities to develop, manufacture and exclusively supply the bulk form of doxorubicin HCl liposome injection to Actavis. Under this agreement, we have also agreed to develop additional products for Actavis, the identities of which will be mutually agreed upon in the future.

Sales and Marketing

As our lead product candidates are still in clinical development, we are in the planning stages of establishing our sales, marketing and product distribution infrastructure. We generally expect to retain commercial rights in the United States and Europe for our oncology product candidates, other than MM-121, for which we receive marketing approvals. We believe that it is possible to access these markets through a focused, specialized field force.

Subject to receiving marketing approvals, we expect to commence commercial activities by building a focused sales and marketing organization for MM-398. This could form the basis of the sales and marketing organization that we will use to sell our other products, subject to receiving marketing approval. We believe that such an organization will be able to address the community of oncologists who are the key specialists in treating solid tumors, including the lung, breast, ovarian, pancreatic, colorectal and head and neck cancers for which our product candidates are being developed. Outside the United States and Europe, we expect to enter into distribution and other marketing arrangements with third parties for any of our product candidates that obtain marketing approval.

We also plan to build a marketing and sales management organization to create and implement marketing strategies for any products that we market through our own sales organization and to oversee and support our sales force. The responsibilities of the marketing organization would include developing educational initiatives with respect to approved products and establishing relationships with thought leaders in relevant fields of medicine.

We plan to tightly integrate the marketing of our therapeutics and companion diagnostics. As we expect to pair various types of diagnostics with our therapeutics, it is likely that the sales and marketing tactics and business model employed for our various diagnostics may differ from one another.

Competition

The biotechnology and pharmaceutical industries are characterized by rapidly advancing technologies, intense competition and a strong emphasis on proprietary products. While we believe that our Network Biology technologies, integrated research, clinical and manufacturing capabilities, development experience and scientific knowledge provide us with competitive advantages, we face potential competition from many different sources, including major pharmaceutical, specialty pharmaceutical and biotechnology companies, academic institutions and governmental agencies and public and private research institutions. Any product candidates that we successfully develop and commercialize will compete with existing therapies and new therapies that may become available in the future.

Many of our competitors may have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials, obtaining regulatory approvals and marketing approved products than we do. Mergers and acquisitions in the pharmaceutical, biotechnology and diagnostic industries may result in even more resources being concentrated among a smaller number of our competitors. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs. Smaller or early stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies.

Table of Contents

The key competitive factors affecting the success of all of our product candidates, if approved, are likely to be their efficacy, safety, convenience, price, the effectiveness of companion diagnostics in guiding the use of related therapeutics, the level of generic competition and the availability of reimbursement from government and other third-party payors.

Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than any products that we may develop. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours. In addition, our ability to compete may be affected because in many cases insurers or other third-party payors seek to encourage the use of generic products. There are many generic products currently on the market for the indications that we are pursuing, and additional products are expected to become available on a generic basis over the coming years. If our therapeutic product candidates are approved, we expect that they will be priced at a significant premium over competitive generic products.

The initial focus of our business is to develop therapeutics and companion diagnostics for the treatment of solid tumor cancers. Cancer is the second most common cause of death in the United States, exceeded only by heart disease, and accounts for almost one of every four deaths in the United States. There are a variety of available drug therapies marketed for solid tumors. In many cases, these drugs are administered in combination to enhance efficacy. Some of these drugs are branded and subject to patent protection, and others are available on a generic basis, including the active ingredients in MM-398 and MM-302. Many of these approved drugs are well established therapies and are widely accepted by physicians, patients and third-party payors. In general, although there has been considerable progress over the past few decades in the treatment of solid tumors and the currently marketed therapies provide benefits to many patients, these therapies all are limited to some extent in their efficacy and frequency of adverse events, and none of them are successful in treating all patients. As a result, the level of morbidity and mortality from solid tumor cancers remains high.

The following table sets forth information about the incidence and selected treatments for some of the solid tumor cancers for which we are developing therapeutic product candidates and companion diagnostics. The U.S. estimated annual incidence is based on information from the American Cancer Society, *Cancer Fact & Figures 2014*.

Tumor Type	U.S. Annual Incidence	Selected Marketed Therapies
Breast	235,030	trastuzumab (Herceptin [®]); docetaxel (Taxotere [®]); paclitaxel (Taxol [®] , Abraxane [®]); capecitabine (Xeloda [®]); tamoxifen (Nolvadex [®] , Soltamox [®]); anastrozole (Arimidex [®]); letrozole (Femara [®]); exemestane (Aromasin [®]); ado-trastuzumab emtansine (Kadcyla [®]); pertuzumab (Perjeta [®]); everolimus (Afinitor [®])
Lung and bronchus	224,210	docetaxel (Taxotere); gemcitabine (Gemzar [®]); pemetrexed (Alimta [®]); gefitinib (Iressa [®]); erlotinib (Tarceva [®]); bevacizumab (Avastin [®]); paclitaxel (Taxol, Abraxane)
Colorectal	136,830	oxaliplatin (Eloxatin [®]); irinotecan (Camptosar [®]); bevacizumab (Avastin); cetuximab (Erbix [®]); panitumumab (Vectibix [®])
Pancreatic	46,420	nab-paclitaxel (Abraxane); gemcitabine (Gemzar); erlotinib (Tarceva)
Liver	33,190	sorafenib (Nexavar [®])

Table of Contents

Tumor Type	U.S. Annual Incidence	Selected Marketed Therapies
Brain and other nervous system cancers	23,380	temozolomide (Temodar®); carmustine (BiCNU®); polifeprosan 20 with carmustine implant (Gliadel®); bevacizumab (Avastin)
Gastric	22,220	capecitabine (Xeloda); trastuzumab (Herceptin); docetaxel (Taxotere); oxaliplatin (Eloxatin); epirubicin (Ellence®)
Ovarian	21,980	liposomal doxorubicin (Doxil); bevacizumab (Avastin); paclitaxel (Taxol, Abraxane); gemcitabine (Gemzar)

In addition to the marketed and generic therapies for solid tumors, there are also a number of products in late stage clinical development to treat solid tumors. These products in development may provide efficacy, safety, convenience and other benefits that are not provided by currently marketed therapies. As a result, they may provide significant competition for any of our product candidates for which we obtain market approval.

Collaboration and License Agreements

We are party to a number of collaboration agreements for the development and commercialization of our product candidates and license agreements under which we license patents, patent applications and other intellectual property. We consider the following collaboration and license agreements to be material to our business.

Actavis

In November 2013, we and Actavis entered into a development, license and supply agreement pursuant to which we will develop, manufacture and exclusively supply the bulk form of doxorubicin HCl liposome injection, or initial product, to Actavis, which Actavis will process into finished product and commercialize globally. We also agreed to develop additional products for Actavis, the identities of which will be mutually agreed upon in the future. We are eligible to receive up to \$15.5 million under the agreement, including \$2.0 million upfront and the remainder in development funding and development, regulatory and commercial milestone payments related to the initial product. We will also receive a double digit share of net profits on global sales of the initial product and any additional products. We will manufacture and supply the initial product to Actavis in bulk form at an agreed upon unit price.

The agreement will expire with respect to each product ten years after Actavis' first sale of such product, unless terminated earlier, and will automatically renew for additional two year periods thereafter unless either party provides notice of non-renewal. Either party may terminate the agreement in the event of an uncured material breach or bankruptcy filing by the other party. Actavis may also terminate the agreement for convenience in specified circumstances upon 90 days' prior written notice.

Sanofi

In September 2009, after MM-121 entered Phase 1 clinical development, we entered into a license and collaboration agreement with Sanofi for the development and commercialization of MM-121. Under the agreement, we granted Sanofi an exclusive, worldwide, royalty-bearing right and license, with the right to grant sublicenses, under our patent rights and know-how to develop and commercialize the monoclonal antibody MM-121 and an MM-121 companion diagnostic. We retained the right, but not the obligation, to participate in the clinical development of MM-121 through Phase 2 proof of concept for each indication and final decision making authority over the conduct of the trials that we conduct, subject to our having the necessary capabilities and resources to conduct those trials and subject to the trials we conduct having been approved by Sanofi as part of the global development plan for MM-121. Sanofi is responsible

for using commercially reasonable efforts thereafter to develop, obtain regulatory approvals for and, following regulatory approval, commercialize MM-121 and a companion diagnostic in each of the United States, Europe and Japan. We also retained an option to co-promote MM-121 in the United States.

Table of Contents

Under the agreement, Sanofi paid us a non-refundable upfront license fee of \$60 million. Sanofi is also responsible for all development and manufacturing costs under the collaboration. In addition, we could receive under the agreement up to an aggregate of \$410 million from Sanofi upon the achievement of specified development and regulatory milestones and an additional \$60 million based on the achievement of specified sales milestones. We have received \$25 million to date based on our achievement of three clinical milestones. Under the agreement, we are entitled to tiered, escalating royalties beginning in the sub-teen double digits based on net sales of MM-121 in the United States and beginning in the high single digits based on net sales of MM-121 outside the United States. In general, Sanofi's obligation to pay us royalties continues on a product-by-product and country-by-country basis until the latest of the expiration of the patent rights covering the product in such country, the expiration of all data and regulatory exclusivity applicable to the product in such country or ten years after the first commercial sale of the product in such country. If we co-promote MM-121 in the United States, we will be responsible for paying our sales force costs and a specified percentage of direct medical affairs, marketing and promotion costs for MM-121 in the United States and will be eligible to receive tiered, escalating royalties beginning in the high teens based on net sales of MM-121 in the United States. We are also entitled to an increase in the royalty rate on a product-by-product and country-by-country basis if a diagnostic product is actually used in the treatment of solid tumor indications with a particular therapeutic product.

Under the agreement, we are obligated to pay all licensing costs for specified third-party patent rights that we or Sanofi may in the future license for the development and commercialization of MM-121. The third-party patent rights for which we are required to pay all licensing costs consist of the patent rights that are the subject of two European Patent Office opposition proceedings and related counterparts worldwide. See Item 3. Legal Proceedings in this Annual Report on Form 10-K for more information. We share the licensing costs for other third-party patent rights that we or Sanofi have licensed or may in the future license for the development and commercialization of MM-121 through specified deductions that Sanofi is permitted to take against the royalties Sanofi pays to us. The third-party patent rights for which we share the costs with Sanofi include rights that we have licensed from Dyax Corp., or Dyax, the U.S. Public Health Service and Selexis SA, as described in more detail below.

A joint steering committee comprised of an equal number of representatives from each of Sanofi and us is responsible for reviewing and approving the global development plan for MM-121, including all budgets relating to development activities we conduct, and overseeing the parties' development and commercialization activities with respect to MM-121. The joint steering committee also oversees a joint development committee responsible for overseeing the progress of the development program. In general, Sanofi has final decision making authority over matters on which the joint steering committee deadlocks, following escalation to designated executive officer representatives of the parties, with the exception of our retained decision making authority over the conduct of clinical trials that we conduct in accordance with the global development plan. If necessary and at a time to be mutually agreed by the parties, we and Sanofi have agreed to form a commercialization committee, also to be overseen by the joint steering committee, that will be responsible for overseeing co-promotion activities in the United States and serving as a forum for communication between the parties regarding worldwide commercialization matters for MM-121.

Sanofi has agreed that, subject to limited exceptions, until the second anniversary of the closing of our initial public offering of common stock, or IPO, neither Sanofi nor any of its affiliates will (1) effect or seek, initiate, offer or propose to effect, or cause or participate in any way, advise or assist any other person to effect or seek, initiate, offer or propose to effect or cause or participate in, any acquisition of any of our securities or assets, any tender or exchange offer, merger, consolidation or other business combination involving us, any recapitalization, restructuring, liquidation, dissolution or other extraordinary transaction with respect to us or any solicitation of proxies or consents to vote any of our voting securities; (2) form, join or in any way participate in a group with respect to any of our securities; (3) otherwise act, alone or in concert with others, to seek to control or influence our management, board of directors or policies, except as contemplated by our collaboration agreement; (4) take any action which would

reasonably be expected to force us to make a public announcement regarding the foregoing; or (5) enter into any agreements, discussions or arrangements with any third party with

Table of Contents

respect to any of the foregoing. Notwithstanding these limitations, we granted a waiver allowing Sanofi to purchase up to 6,300,000 shares of our common stock.

If not terminated earlier, the agreement will expire upon expiration of all royalty and other payment obligations of Sanofi under the agreement. Either party may terminate the agreement in the event of an uncured material breach by the other party. Sanofi also may terminate the agreement for its convenience upon 180 days prior written notice. In addition, we may terminate the agreement if Sanofi challenges or supports any challenge of our licensed patent rights.

In June 2012, we entered into a right of review agreement with Sanofi pursuant to which, if we determine to enter into negotiations with a third party regarding any license, option, collaboration, joint venture or similar transaction involving any therapeutic or companion diagnostic product candidate in our pipeline, we will notify Sanofi of such opportunity. Following such notice, Sanofi will have a specified period of time to review the opportunity and determine whether to exercise an additional right to exclusively negotiate an agreement with us with respect to such opportunity for a specified period of time. If Sanofi does not exercise such right of negotiation, we may enter into negotiations with third parties with respect to the opportunity, provided that we may only enter into an agreement with a third party with respect to those countries that were initially offered to Sanofi. On the other hand, if Sanofi does exercise such right of negotiation but we and Sanofi do not reach a mutually acceptable agreement during the negotiation period, we may enter into negotiations with third parties with respect to the opportunity, provided that we may not enter into an agreement within a specified period of time following the end of the negotiation period if either (i) the agreement involves countries that were not previously offered to Sanofi or (ii) the terms and conditions of such agreement are materially more favorable to the third party than what was previously offered by Sanofi. If we propose to enter into any third-party agreement described in the provisos of the preceding two sentences, we must first offer the same terms and conditions to Sanofi. In addition, if we intend to spin out certain of our research and development activities to a newly established, partially owned subsidiary, we will notify Sanofi prior to the initial fundraising for such spin-out. Following such notice, Sanofi will be entitled to review the proposed investment terms, although the final terms and participants of such investment will be determined solely by the board of directors of the spin-out. The right of review terminates on April 1, 2017.

PharmaEngine

In May 2011, we entered into an assignment, sublicense and collaboration agreement with PharmaEngine. Under the agreement, PharmaEngine assigned to us its rights and obligations under a 2005 agreement with Hermes BioSciences, Inc., or Hermes, to develop and commercialize MM-398 in Europe and certain countries in Asia. Through our acquisition of Hermes in 2009, we hold the rights to MM-398 in North America and the rest of the world. PharmaEngine also granted to us an exclusive right and license, with the right to sublicense, under PharmaEngine technology and rights to develop and commercialize MM-398 worldwide outside of Taiwan. We granted to PharmaEngine a paid-up, royalty free, exclusive right and license under our technology and rights to develop and commercialize MM-398 in Taiwan.

Under the agreement, we have paid PharmaEngine a \$10 million upfront license fee and a \$5 million milestone payment. In addition, PharmaEngine is eligible to receive up to an aggregate of \$205 million from us upon the achievement of specified development, regulatory and annual net sales milestones. Under the agreement, PharmaEngine is entitled to tiered royalties based on net sales of MM-398 in Europe and certain countries in Asia. The royalty rates under the agreement range from high single digits up to the low teens as a percentage of our net sales of MM-398 in these territories. Our obligation to pay royalties to PharmaEngine continues on a country-by-country basis until the later of ten years after the first commercial sale of MM-398 in such country and May 2, 2024. We are responsible for the development and commercialization, and all related costs and expenses, of MM-398 in all countries except Taiwan, where PharmaEngine retains the right to develop and commercialize MM-398 at its expense.

Each party has agreed to use commercially reasonable efforts to develop, in accordance with a development plan, and commercialize MM-398 in its respective territory. We also

Table of Contents

have a diligence obligation to initiate a second Phase 3 clinical trial of MM-398 in a different solid tumor indication within a timeframe specified in the agreement.

Multiple executive committees were formed under the agreement, each comprised of an equal number of representatives from each party. The steering committee is responsible for reviewing and approving changes to the development plan, providing overall strategic direction with respect to development of MM-398 under the development plan and overseeing other committees. The steering committee is also responsible for resolving any disputes arising under the agreement at the steering committee or that are referred to it by any of the other committees. If a matter is unresolved by the steering committee, it may be referred for resolution to executive officers from both companies. We have final decision making authority on any such matter not resolved by the executive officers that relates to the worldwide development of MM-398 or commercialization of MM-398 outside of Taiwan. The development committee is responsible for recommending to the steering committee changes to the development plan and overseeing the progress of the development program and monitoring the parties' compliance with their respective obligations under the development plan.

Upon expiration of all royalty and other payment obligations due to PharmaEngine under this agreement on a country-by-country basis, the licenses granted under the agreement will be deemed to be perpetual, fully paid-up and irrevocable with respect to the licensed product in such country. Either party may terminate the agreement in the event of an uncured material breach by the other party. In addition, at any time after May 2013, we may terminate the agreement for convenience upon 90 days' prior written notice. If PharmaEngine terminates this agreement in its entirety or with respect to Europe or the Asian territories because of our material breach, or if we terminate the agreement for convenience with respect to Europe or the Asian territories, then we are required to grant PharmaEngine a license under our technology and rights with respect to MM-398 in Europe or the Asian territories, as applicable, and PharmaEngine is required to pay us single-digit royalties for net sales of MM-398 in such territories.

Dyax

In January 2007, we entered into an amended and restated collaboration agreement with Dyax, which superseded a prior collaboration agreement with Dyax that we entered into in December 2005. Under this collaboration agreement, Dyax uses its proprietary phage display technology to identify antibodies that bind to targets of interest to us as therapeutics or diagnostics. Further, Dyax has granted to us a worldwide, non-exclusive, royalty free right to use and make any and all of the antibodies identified by Dyax for certain research purposes. In order to clinically develop or commercialize any such antibody, however, we must obtain an additional product license from Dyax on a target-by-target basis. We have the option to obtain one or more product licenses on terms set forth in the collaboration agreement, subject to limitations on the availability of each such product license under an agreement between Dyax and Cambridge Antibody Technologies, which has merged with MedImmune, LLC and is now owned by AstraZeneca PLC.

As consideration for the grant of the initial research license, we paid Dyax a research fee based on the total estimated full time equivalent researchers that were required to conduct the research plan and a fee for achieving certain technical milestones. If we elect to obtain a product license with respect to any therapeutic or diagnostic target, we are required to pay to Dyax an additional upfront license fee for the applicable antibody. We also will be required to make additional maximum aggregate development and regulatory milestone payments of \$16.2 million for therapeutic products and maximum aggregate regulatory milestone payments of \$1.0 million for diagnostic products directed to selected targets. In addition, Dyax is entitled to mid single digit royalties based on net sales of products covered by any product license that we obtain from Dyax. Our obligation to pay royalties to Dyax continues on a product-by-product and country-by-country basis until the later of a specified number of years after the first commercial sale of the product in such country and the expiration of the patent rights covering the product in such

country. MM-121 and a component of MM-141 were identified under this agreement, and we have obtained the required target licenses from Dyax by exercising our product license options and paying the applicable license fees. We are obligated to use commercially reasonable efforts to develop and commercialize the antibodies for which we obtain a commercial license.

Table of Contents

This agreement will remain in effect, unless terminated earlier, for so long as we or any of our affiliates or sublicensees continue to develop or commercialize products that remain royalty-bearing under the agreement. Either party may terminate the agreement in the event of an uncured material breach by the other party. We also may terminate the agreement in its entirety or on a product-by-product basis at any time upon 90 days' prior written notice.

Adimab

In November 2009, we entered into a collaboration agreement with Adimab LLC, or Adimab, to allow us to evaluate the utility of using antibodies identified during the collaboration as therapeutics or diagnostics. Under the agreement, Adimab granted to us a worldwide, non-exclusive, royalty free right to use materials provided by Adimab to perform non-clinical research during the evaluation term. Adimab also granted to us an option to obtain the assignment of specified patent rights claiming the selected antibodies and a license under Adimab's background patent rights and know-how for the development and commercialization of the antibodies.

As partial consideration for the research license grant, we paid Adimab a technology access fee at the time of grant, research fees based on the total estimated full time equivalent researchers that were required to conduct the research plan and a fee for achieving certain technical milestones. We have exercised our assignment and license option by paying Adimab a fee of \$1.0 million. In addition, we are required to pay Adimab up to an aggregate of \$13.5 million per therapeutic area, for the first four therapeutic areas, upon achievement of specified development and regulatory milestones, of which we have paid \$1.5 million with respect to the first therapeutic area, and up to an aggregate of \$500,000 per diagnostic product upon the achievement of specified regulatory milestones. In addition, Adimab is entitled to mid single digit royalty payments based on net sales of therapeutic products and diagnostic products arising from the collaboration. Our obligation to pay royalties to Adimab continues on a product-by-product and country-by-country basis until the later of a specified number of years after the first commercial sale of the product in such country and the expiration of the patent rights covering the product in such country, provided that the royalty term will not extend beyond a specified number of years after the first commercial sale of the product in such country. We are obligated to use commercially reasonable efforts to develop and commercialize at least one product that incorporates the antibodies for which we exercised our assignment and license option in each of the United States, Europe and Japan. MM-151 was generated under this agreement.

The term of the agreement expires on a country-by-country basis on the earliest date after which no payments are due to Adimab, unless earlier terminated. Either party may terminate the agreement in the event of an uncured material breach by the other party. In addition, we may terminate the agreement at any time upon 90 days' prior written notice.

University of California

2005 agreement

In March 2005, we entered into a license agreement with The Regents of the University of California, or the Regents. Under the agreement, the Regents granted to us a royalty-bearing right and license in the United States and other countries where the Regents have the right to grant the license under certain patent rights and rights in biological materials to develop and commercialize products for therapeutic or diagnostic use in humans that are covered by the licensed patents. Licensed products under this agreement include MM-111. This license is exclusive with respect to certain patents, including some relevant to MM-111, and non-exclusive with respect to other patents and biological materials. The agreement requires that we diligently pursue the development, manufacture and commercialization of licensed products. In addition, we are required to meet specific development, regulatory and commercialization milestones within timeframes specified in the agreement. We have sole responsibility for the development and commercialization of products under the licensed technology. However, the agreement provides that the Regents may

require us to sublicense our exclusive rights for the application or use of licensed products covered by any exclusively licensed technology that we are not currently pursuing.

Table of Contents

We are required to pay to the Regents an annual license maintenance fee of between \$20,000 and \$30,000 until the first commercial sale of a licensed product and are responsible for all development costs. In addition, we are required to pay to the Regents up to an aggregate of \$725,000 per therapeutic product, other than the second therapeutic product, for which we are responsible for up to an aggregate of \$906,250, based on the achievement of specified development and regulatory milestones. The Regents are also entitled to royalties in the low single digits based on net sales of products covered by the licensed technology. A minimum annual royalty is due to the Regents commencing in the earlier of the year of the first commercial sale of a licensed product or 2015. The minimum annual royalty increases from \$100,000 in the first year it is payable to \$500,000 in the fifth year and thereafter for the life of the patents. If we sublicense the rights granted to us under the licensed technology to a third party, then we are also obligated to pay to the Regents a portion of the sublicensing income related to the licensed technology.

If not terminated earlier, this agreement terminates upon the later of nine years from the market introduction of the last licensed product that contains the licensed biological materials or the expiration of all patent rights licensed under this agreement. At such time, we will have a perpetual, fully paid, world-wide, non-exclusive license. The Regents may terminate the agreement in the event of an uncured material breach by us. We may terminate the agreement on a country-by-country basis at any time upon 60 days prior written notice.

2000 agreement

In November 2000, we entered into a separate exclusive license agreement with the Regents. Under the agreement, the Regents granted us a royalty-bearing world-wide right and license under certain patent rights for the development and commercialization of products that are covered by the licensed patent rights, including MM-302. The agreement requires that we diligently pursue the development, manufacture and commercialization of licensed products. In addition, we are required to meet specified development, regulatory and commercialization milestones within timeframes specified in the agreement. We have the sole responsibility for the development and commercialization of products under the licensed technology.

We are required to pay to the Regents an annual license maintenance fee of \$95,000 until the first commercial sale of a licensed product. We also are responsible for all development costs and have agreed to spend a minimum of \$150,000 per year for such costs. In addition, we are responsible for up to an aggregate of \$700,000 per product upon the achievement of specified development and regulatory milestones. The Regents are also entitled to royalties in the low single digits based on net sales of products covered by the licensed technology. If we sublicense the rights granted to us under the licensed technology to a third party, then we are also obligated to pay to the Regents a portion of the sublicensing income related to the licensed technology.

If not terminated earlier, this agreement terminates upon the expiration or abandonment of all patents licensed under this agreement. The Regents may terminate the agreement in the event of an uncured material breach by us. We may terminate the agreement on a country-by-country basis at any time upon 60 days prior written notice.

U.S. Public Health Service

In February 2008, we entered into a commercial license with the U.S. Public Health Service, a division of the U.S. Department of Health and Human Services, for non-exclusive rights in the United States to patents related to ErbB3 and ErbB3 antibodies associated with MM-121, MM-111 and MM-141. Under the agreement, we may be required to make aggregate development and regulatory milestone payments of up to \$6.0 million per therapeutic licensed product and pay low single digit royalties on net sales of licensed products. The term of the agreement extends until the expiration of the licensed patent rights, which is 2016.

Selexis

In June 2008, we entered into a commercial license with Selexis SA for non-exclusive rights to technology for use in the manufacture of certain biologic products, including each of our six most advanced product candidates, other than MM-398. Under this agreement, we are required to make aggregate milestone payments of

Table of Contents

up to 1.0 million per licensed product and pay royalties of less than one percent on net sales of licensed products. The obligation to pay royalties with respect to each product sold in a country continues until the expiration of the patent rights covering the product in such country.

Intellectual Property

We aggressively strive to protect the proprietary technology that we believe is important to our business, including seeking and maintaining patents intended to cover our products and compositions, their methods of use and processes for their manufacture, as well as our diagnostic and drug discovery technologies and any other inventions that are commercially important to the development of our business. We also rely on trade secrets to protect aspects of our business that are not amenable to, or that we do not consider appropriate for, patent protection, such as our proprietary network modeling programs and large scale protein and liposome production methods.

Our success will significantly depend on our ability to obtain and maintain patent and other proprietary protection for commercially important technology, inventions and know-how related to our business, defend and enforce our patents, preserve the confidentiality of our trade secrets and operate without infringing the valid and enforceable patents and proprietary rights of third parties. We also rely on know-how, continuing technological innovation and in-licensing opportunities to develop and maintain our proprietary position.

We seek to obtain domestic and international patent protection, and endeavor to promptly file patent applications for new commercially valuable inventions once the experimental data necessary for an application become available. We generally file international applications under the Patent Cooperation Treaty, or PCT, within one year after the filing of a U.S. provisional application.

As of January 31, 2014, we owned 14 issued U.S. patents and four allowed U.S. patent applications, four issued patents in Europe, and 37 issued patents and seven allowed patent applications in other jurisdictions, as well as 32 pending U.S. provisional and non-provisional patent applications and 216 pending foreign patent applications in Europe and other jurisdictions. As of January 31, 2014, we also co-owned one U.S. and 49 pending foreign patent applications with Sanofi, as well as one U.S. non-provisional and seven foreign patent applications with Silver Creek. As of January 31, 2014, we had licenses to 41 U.S. patents and five pending U.S. patent applications, as well as numerous foreign counterparts to many of these patents and patent applications. Of these licensed patents and patent applications, we license the majority on an exclusive basis, with the rest licensed non-exclusively to us. The exclusive licenses are, in some cases, limited to certain technical fields, for example for medical and diagnostic purposes.

The patent portfolios for our six most advanced product candidates as of January 31, 2014 are summarized below.

MM-398

Our MM-398 patent portfolio is wholly owned by us and includes two issued U.S. patents, two allowed U.S. patent applications, and one other pending U.S. patent application covering the composition of and methods of making and using MM-398, all of which expire or, if issued, will expire in 2025, except for one U.S. patent and one allowed application that expire in 2028. Related international patent applications have issued or been allowed in seven countries and are pending in Europe and a number of other countries. These international patents and patent applications, if issued, will expire in 2025. Our MM-398 portfolio further includes one pending PCT dosage and administration patent application that is eligible for worldwide filings that, if issued, will expire in 2033.

MM-121

Our MM-121 patent portfolio is wholly owned by us, with the exception of:

one method of use application that has been filed in the United States and 28 foreign jurisdictions worldwide, which is co-owned with Sanofi and, if issued, will expire in 2032;

Table of Contents

four method of use applications that are co-owned with Sanofi that have been filed in 11 foreign jurisdictions; and

one family of U.S. patents broadly covering anti-ErbB3 antibodies, the last of which will expire in 2016, that are licensed non-exclusively from the U.S. Public Health Service, a division of the U.S. Department of Health and Human Services.

Our wholly owned MM-121 portfolio includes a U.S. composition of matter patent, six issued foreign patents, and one allowed and one other pending U.S. patent application. In foreign jurisdictions, one related patent is issued in Europe and five other jurisdictions, and two applications are pending in Europe and 16 other jurisdictions; these expire or, if issued, will expire in 2028.

Pending method of use and diagnostic patents in this portfolio also include:

one U.S. provisional patent application that will be used as the basis of a PCT application, for which international patents, if issued, would expire in 2034;

one PCT application that is eligible for worldwide filings that, if issued, will expire in 2033;

one U.S. and 16 foreign patent applications that, if issued, will expire in 2032;

one U.S. and 10 foreign patent applications that, if issued, will expire in 2032;

one U.S. and 17 foreign patent applications that, if issued, will expire in 2031; and

one issued U.S. patent and two pending U.S. patent applications, related issued foreign patents in Europe and four other jurisdictions, and related pending foreign applications in 12 other jurisdictions that, if issued, will expire in 2029.

MM-111

Our MM-111 patent portfolio includes five wholly owned, pending U.S. patent applications covering the composition of, and method of use and diagnostics for, MM-111 that, if issued, will expire between 2029 and 2032. This portfolio also includes one PCT application that remains eligible for worldwide filings that, if issued, will expire in 2033. This portfolio also includes 50 related patent applications pending in Europe and a number of other jurisdictions that, if issued, will expire between 2028 and 2032.

In addition, this portfolio includes the following patents licensed from the Regents:

an exclusively licensed family of patents and patent applications that expire or, if issued, will expire in 2023, including three issued U.S. composition of matter patents, a pending U.S. and European divisional application, an issued European composition of matter patent that has been validated in 15 European Patent Organization countries, two issued foreign patents and related applications pending in a number of other countries; and

a non-exclusively licensed family of patents and a patent application that expire or, if issued, will expire in 2016, including granted U.S. and European composition of matter patents and an application pending in Canada.

MM-302

Our MM-302 patent portfolio includes one wholly owned pending U.S. non-provisional application and nine foreign dosage and administration patent applications that, if issued, will expire in 2031; two PCT applications (one combination therapy and one diagnostic) that remain eligible for worldwide filings that, if issued, will expire in 2033; and two U.S. provisional applications (one combination therapy and one diagnostic) that may be used to establish non-provisional applications that, if issued, will expire in 2034. This portfolio also includes the following exclusively licensed issued U.S. patents:

six composition of matter patents that expire between 2014 and 2019; and

one method of use patent that expires in 2019.

Table of Contents

In addition, this portfolio includes the following exclusively licensed European patents:

a composition of matter patent that expires in 2019;

a composition of matter and method patent that expires in 2019; and

a composition of matter patent that expires in 2014.

Our licensed MM-302 patent portfolio further includes several foreign composition of matter patents and patent applications that expire or, if issued, will expire between 2014 and 2017.

All of the licensed patents and patent applications related to MM-302 are licensed from the Regents.

MM-151

Our MM-151 patent portfolio is wholly owned and includes one U.S. and 10 foreign patent applications covering compositions, methods of use and diagnostics that is eligible for worldwide filings that, if issued, will expire in 2032. This portfolio also consists of one pending U.S. composition of matter and method of use patent application and 13 related pending foreign applications that, if issued, will expire in 2031, and one allowed U.S. and a related pending European diagnostic patent application that, if issued, will expire in 2032.

MM-141

Our MM-141 patent portfolio is wholly owned and consists of three pending patent applications. One of these pending patent applications covers the principle and methods of co-targeting IGF-1R and ErbB3 in human disease and is pending in the US, Europe, Canada, Australia and Japan, and if issued will expire no sooner than 2030. A second patent family covering compositions, methods of use, and disease indications has an issued U.S. patent, a pending U.S. patent application, and is pending in Europe and 7 other foreign jurisdictions. These patents and patent applications expire, or will expire, no sooner than 2032. A third pending application is an international application that remains eligible for worldwide filing in all PCT countries and covers compositions, methods of use, disease indications and drug combination regimens related to MM-141, and if issued will expire no sooner than 2033.

The term of individual patents depends upon the legal term for patents in the countries in which they are obtained. In most countries, including the United States, the patent term is 20 years from the earliest filing date of a non-provisional patent application. In the United States, a patent's term may be lengthened by patent term adjustment, which compensates a patentee for administrative delays by the U.S. Patent and Trademark Office in examining and granting a patent, or may be shortened if a patent is terminally disclaimed over an earlier filed patent. The term of a patent that covers a drug, biological product or medical device approved pursuant to a pre-market approval, or PMA, may also be eligible for patent term extension when FDA approval is granted, provided statutory and regulatory requirements are met. The length of the patent term extension is related to the length of time the drug is under regulatory review while the patent is in force. The Drug Price Competition and Patent Term Restoration Act of 1984, or the Hatch-Waxman Act, permits a patent term extension of up to five years beyond the expiration date set for the patent. Patent extension cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval, only one patent applicable to each regulatory review period may be granted an extension and only those claims reading on the approved drug are extended. Similar provisions are available in Europe and other foreign

jurisdictions to extend the term of a patent that covers an approved drug. In the future, if and when our product candidates receive approval by the FDA or foreign regulatory authorities, we expect to apply for patent term extensions on issued patents covering those products, depending upon the length of the clinical trials for each drug and other factors, including those involved in the filing of a biologics license application, or BLA, or a new drug application, or NDA.

We are currently engaged in two ongoing opposition proceedings to European patents in the European Patent Office to narrow or invalidate the claims of patents owned by third parties. For more information, see

Table of Contents

Item 3. Legal Proceedings in this Annual Report on Form 10-K. We have obtained favorable interim decisions in both oppositions, which are now under appeal. The ultimate outcome of these oppositions remains uncertain. We are also aware of issued or pending counterparts to some of these European patents in the United States that may be relevant to our development and commercialization of MM-121. In addition, we are aware of issued U.S. patents held by Genentech, Inc., or Genentech, broadly covering methods of producing certain types of recombinant antibodies and related compositions for antibody production that may be relevant to our development and commercialization of MM-121, MM-151 and MM-141.

We rely, in some circumstances, on trade secrets to protect our technology. However, trade secrets can be difficult to protect. We seek to protect our proprietary technology and processes, in part, by confidentiality agreements with our employees, consultants, scientific advisors and contractors. We also seek to preserve the integrity and confidentiality of our data and trade secrets by maintaining physical security of our premises and physical and electronic security of our information technology systems. While we have confidence in these individuals, organizations and systems, agreements or security measures may be breached, and we may not have adequate remedies for any breach. In addition, our trade secrets may otherwise become known or be independently discovered by competitors. To the extent that our consultants, contractors or collaborators use intellectual property owned by others in their work for us, disputes may arise as to the rights in related or resulting know-how and inventions.

Silver Creek

In August 2010, we acquired 12,000,000 shares of Series A preferred stock of Silver Creek, a newly formed company, in exchange for our grant to Silver Creek of technology licenses. We granted to Silver Creek a royalty free license under certain antibody growth factor patent rights to develop and commercialize products covered by the licensed patent rights. This license is exclusive to Silver Creek for therapeutic or diagnostic use in humans for the promotion of organ regeneration and co-exclusive with us for all other uses. We also granted to Silver Creek royalty free, non-exclusive licenses under certain patent rights and know-how to use certain of our technologies for research and development purposes. Either party may terminate the agreement in the event of an uncured material breach by the other party.

In August and December 2010, Silver Creek issued and sold an aggregate of 4,189,904 additional shares of its Series A preferred stock at a price per share of \$1.00 to other investors for an aggregate purchase price of \$4,189,904. In addition, on December 21, 2012, Silver Creek entered into a Note Purchase Agreement pursuant to which it issued convertible notes to various lenders, which did not include us, in aggregate principal amounts of \$1.6 million in December 2012, \$0.3 million in February 2013 and \$0.6 million in December 2013. The convertible notes bore interest at 6%. The notes matured and converted, along with accrued interest of \$0.1 million, into 2,603,281 shares of Silver Creek Series A preferred stock on December 31, 2013. As of January 31, 2014, we owned approximately 64% of the outstanding capital stock of Silver Creek, making Silver Creek a majority owned subsidiary of ours.

Silver Creek is applying our Network Biology approach to the discovery and development of innovative therapeutics in the field of regenerative medicine. In the future, we may consider forming additional businesses or business units to apply our Network Biology approach to multiple additional disease areas outside the oncology field. We expect to do so in some cases, as with Silver Creek, through the establishment of separately funded companies.

Government Regulation

Government authorities in the United States, at the federal, state and local level, and in other countries extensively regulate, among other things, the research, development, testing, manufacture, including any manufacturing changes, packaging, storage, recordkeeping, labeling, advertising, promotion, distribution, marketing, post-approval monitoring

and reporting, import and export of pharmaceutical products, biological products and medical devices, such as those we are developing.

Table of Contents

United States drug and biological product approval process

In the United States, the FDA regulates drugs and biological products under the Federal Food, Drug, and Cosmetic Act, or FDCA, the Public Health Service Act, or PHSA, and implementing regulations. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations requires the expenditure of substantial time and financial resources. Failure to comply with the applicable United States requirements at any time during the product development process, approval process or after approval may subject an applicant to a variety of administrative or judicial sanctions, such as the FDA's refusal to approve pending applications, withdrawal of an approval, imposition of a clinical hold, issuance of untitled or warning letters, product recalls, product seizures, total or partial suspension of production or distribution injunctions, fines, refusals of government contracts, restitution, disgorgement of profits, civil penalties and criminal prosecution.

The process required by the FDA before a drug or biological product may be marketed in the United States generally involves the following:

completion of preclinical laboratory tests, animal studies and formulation studies in compliance with the FDA's good laboratory practice, or GLP, regulations;

submission to the FDA of an IND, which must become effective before human clinical trials may begin;

approval by an independent institutional review board, or IRB, at each clinical site before each trial may be initiated;

performance of adequate and well-controlled human clinical trials in accordance with good clinical practices, or GCP, to establish the safety and efficacy of the proposed drug or biological product for each indication;

submission to the FDA of an NDA or BLA, as applicable;

satisfactory completion of an FDA advisory committee review, if applicable;

satisfactory completion of an FDA inspection of the manufacturing facility or facilities at which the product is produced to assess compliance with cGMP requirements and to assure that the facilities, methods and controls are adequate to preserve the drug's identity, strength, quality and purity; and

FDA review and approval of the NDA or BLA.

We expect that all of our clinical product candidates, other than MM-398, will be subject to review as biological products under BLA standards. We expect that MM-398 will be subject to review as a drug under NDA standards. MM-302 contains both drug and biological components. We believe that this combination product will be subject to review as a biological product, pursuant to a BLA. However, it is possible that the FDA could consider MM-302

subject to review pursuant to an NDA.

Preclinical studies

Preclinical studies include laboratory evaluation of product chemistry and formulation, as well as *in vitro* and animal studies to assess the potential for adverse events and in some cases to establish a rationale for therapeutic use. The conduct of preclinical studies is subject to federal regulations and requirements, including GLP regulations. An IND sponsor must submit the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and a proposed protocol for clinical studies, among other things, to the FDA as part of an IND. Some long-term preclinical testing, such as animal tests of reproductive adverse events and carcinogenicity, may continue after the IND is submitted. An IND automatically becomes effective 30 days after receipt by the FDA, unless before that time the FDA raises concerns or questions related to one or more proposed clinical trials and places the trial on clinical hold. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. As a result, submission of an IND may not result in the FDA allowing clinical trials to commence.

Table of Contents

Clinical trials

Clinical trials involve the administration of the investigational new drug to human subjects—healthy volunteers or patients—under the supervision of qualified investigators in accordance with GCP requirements, which include, among other things, the requirement that all research subjects provide their informed consent in writing before their participation in any clinical trial. Clinical trials are conducted under written study protocols detailing, among other things, the objectives of the study, the parameters to be used in monitoring safety and the effectiveness criteria to be evaluated. A protocol for each clinical trial and any subsequent protocol amendments must be submitted to the FDA as part of the IND. In addition, an IRB at each institution participating in the clinical trial must review and approve the plan for any clinical trial before it commences at that institution, and the IRB must conduct continuing review and reapprove the study at least annually. The IRB must review and approve, among other things, the study protocol and informed consent information to be provided to study subjects. An IRB may also require the clinical trial at the site to be halted, either temporarily or permanently, for failure to comply with the IRB's requirements, or may impose other conditions. An IRB must operate in compliance with FDA regulations. Information about certain clinical trials must be submitted within specific timeframes to the National Institutes of Health for public dissemination on their ClinicalTrials.gov website.

Human clinical trials are typically conducted in three sequential phases, which may overlap or be combined:

Phase 1: The drug or biological product is initially introduced into healthy human subjects or patients with the target disease or condition and tested for safety, side effects associated with increasing doses, pharmacological action, absorption, metabolism, distribution, excretion and, if possible, to gain an early indication of its effectiveness.

Phase 2: The drug or biological product is administered to a limited patient population to identify common adverse effects and safety risks, to preliminarily evaluate the efficacy of the product for specific targeted diseases and to determine dosage tolerance and optimal dosage.

Phase 3: The drug or biological product is administered to an expanded patient population in adequate and well-controlled clinical trials, typically at geographically dispersed clinical trial sites, to generate sufficient data to statistically confirm the efficacy and safety of the product for approval, to permit the FDA to evaluate the overall risk-benefit profile of the product and to provide adequate information for the labeling of the product.

Progress reports detailing the results of the clinical trials must be submitted at least annually to the FDA and more frequently if serious adverse events occur. Phase 1, Phase 2 and Phase 3 clinical trials may not be completed successfully within any specified period, or at all. Furthermore, the FDA or the sponsor may suspend or terminate a clinical trial at any time on various grounds, including a finding that the research subjects are being exposed to an unacceptable health risk. Similarly, an IRB can suspend or terminate approval of a clinical trial at its institution if the clinical trial is not being conducted in accordance with the IRB's requirements or if the drug has been associated with unexpected serious harm to patients.

Disclosure of clinical trial information

Sponsors of clinical trials of FDA regulated products, including drugs, are required to register and disclose certain clinical trial information. Information related to the product, patient population, phase of investigation, study sites and investigators, and other aspects of the clinical trial is then made public on the ClinicalTrials.gov website as part of the registration. Sponsors are also obligated to disclose the results of their clinical trials after completion. Disclosure of the results of these trials can be delayed until the new product or new indication being studied has been approved. Competitors may use this publicly available information to gain knowledge regarding the progress of development programs.

Marketing approval

Assuming successful completion of the required clinical testing, the results of the preclinical and clinical studies, together with detailed information relating to the product's pharmacology chemistry, manufacture,

Table of Contents

controls and proposed labeling, among other things, are submitted to the FDA as part of an NDA or BLA requesting approval to market the product for one or more indications. FDA approval of the NDA or BLA is required before marketing of the product may begin in the United States. Under federal law, the submission of most NDAs and BLAs is additionally subject to a substantial application user fee, currently exceeding \$2,169,000, and the sponsor of an approved NDA or BLA is also subject to annual product and establishment user fees, currently exceeding \$104,000 per product and \$554,000 per establishment. These fees are typically increased annually.

The FDA conducts a preliminary review of all NDAs and BLAs within the first 60 days after receipt before accepting them for filing based on the agency's threshold determination that they are sufficiently complete to permit substantive review. The FDA may request additional information rather than accept an NDA or BLA for filing. In this event, the application must be resubmitted with the additional information. The resubmitted application is also subject to review before the FDA accepts it for filing. Once the submission is accepted for filing, the FDA begins an in-depth substantive review. The FDA has agreed to specified performance goals in the review of NDAs and BLAs. Most such applications for non-priority products are reviewed within ten to twelve months after filing, and most applications for priority review products, that is, drugs and biologics that the FDA determines represent a significant improvement over existing therapy, are reviewed in six to eight months after filing. The review process may be extended by the FDA for three additional months to consider certain late-submitted information or clarification regarding information already provided in the submission. The FDA may also refer applications for novel drugs or biological products or products that present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions.

Before approving an NDA or BLA, the FDA typically will inspect the facility or facilities where the product is manufactured. The FDA will not approve an application unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product within required specifications. In addition, before approving an NDA or BLA, the FDA will typically inspect one or more clinical sites to assure compliance with GCP and integrity of the clinical data submitted.

The testing and approval process requires substantial time, effort and financial resources, and each may take many years to complete. Data obtained from clinical activities are not always conclusive and may be susceptible to varying interpretations, which could delay, limit or prevent regulatory approval. The FDA may not grant approval on a timely basis, or at all. We may encounter difficulties or unanticipated costs in our efforts to develop our product candidates and secure necessary governmental approvals, which could delay or preclude us from marketing our products.

After the FDA's evaluation of the NDA or BLA and inspection of the manufacturing facilities, the FDA may issue an approval letter or a complete response letter. An approval letter authorizes commercial marketing of the drug or biological product with specific prescribing information for specific indications. A complete response letter generally outlines the deficiencies in the submission and may require substantial additional testing or information in order for the FDA to reconsider the application. If and when those deficiencies have been addressed to the FDA's satisfaction in a resubmission of the NDA, the FDA will issue an approval letter. The FDA has committed to reviewing such resubmissions in two or six months depending on the type of information included. Even with submission of this additional information, the FDA ultimately may decide that the application does not satisfy the regulatory criteria for approval.

Even if the FDA approves a product, it may limit the approved indications for use for the product, require that contraindications, warnings or precautions be included in the product labeling, require that post-approval studies, including Phase 4 clinical trials, be conducted to further assess a drug's safety after approval, require testing and

surveillance programs to monitor the product after commercialization, or impose other conditions,

Table of Contents

including distribution restrictions or other risk management mechanisms, which can materially affect the potential market and profitability of the product. The FDA may prevent or limit further marketing of a product based on the results of post-market studies or surveillance programs. After approval, some types of changes to the approved product, such as changes in indications, manufacturing changes and labeling, are subject to further testing requirements and FDA review and approval.

Fast track designation

The FDA is required to facilitate the development and expedite the review of drugs and biologics that are intended for the treatment of a serious or life-threatening disease or condition for which there is no effective treatment and which demonstrate the potential to address unmet medical needs for the condition. Under the fast track program, the sponsor of a new drug or biologic candidate may request the FDA to designate the product for a specific indication as a fast track product concurrent with or after the filing of the IND for the product candidate. The FDA must determine if the product candidate qualifies for fast track designation within 60 days after receipt of the sponsor's request.

In addition to other benefits, such as the ability to use surrogate endpoints and have greater interactions with the FDA, the FDA may initiate review of sections of a fast track product's NDA or BLA before the application is complete. This rolling review is available if the applicant provides and the FDA approves a schedule for the submission of the remaining information and the applicant pays applicable user fees. However, the FDA's time period goal for reviewing a fast track application does not begin until the last section of the NDA or BLA is submitted. In addition, the fast track designation may be withdrawn by the FDA if the FDA believes that the designation is no longer supported by data emerging in the clinical trial process.

Priority review

Under FDA policies, a product candidate may be eligible for priority review, or review within a six to eight month time frame from the time a complete application is accepted for filing. Products regulated by the FDA's Center for Drug Evaluation and Research, or CDER, are eligible for priority review if they provide a significant improvement compared to marketed products in the treatment, diagnosis or prevention of a disease. Products regulated by the FDA's Center for Biologics Evaluation and Research are eligible for priority review if they provide a significant improvement in the safety or effectiveness of the treatment, diagnosis or prevention of a serious or life-threatening disease. A fast track designated product candidate would ordinarily meet the FDA's criteria for priority review.

Accelerated approval

Under the FDA's accelerated approval regulations, the FDA may approve a drug or biologic for a serious or life-threatening illness that provides meaningful therapeutic benefit to patients over existing treatments based on a surrogate endpoint that is reasonably likely to predict clinical benefit. In clinical trials, a surrogate endpoint is a measurement of laboratory or clinical signs of a disease or condition that substitutes for a direct measurement of how a patient feels, functions or survives. Surrogate endpoints can often be measured more easily or more rapidly than clinical endpoints. A product candidate approved on this basis is subject to rigorous post-marketing compliance requirements, including the completion of Phase 4 or post-approval clinical trials to confirm the effect on the clinical endpoint. Failure to conduct required post-approval studies, or confirm a clinical benefit during post-marketing studies, would allow the FDA to withdraw the drug from the market on an expedited basis. All promotional materials for drug candidates approved under accelerated regulations are subject to prior review by the FDA.

Breakthrough therapy designation

The FDA is also required to expedite the development and review of the application for approval of drugs that are intended to treat a serious or life-threatening disease or condition where preliminary clinical evidence

Table of Contents

indicates that the drug may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints. Under the breakthrough therapy program, the sponsor of a new drug candidate may request that the FDA designate the drug candidate for a specific indication as a breakthrough therapy concurrent with, or after, the filing of the IND for the drug candidate. The FDA must determine if the drug candidate qualifies for breakthrough therapy designation within 60 days of receipt of the sponsor's request.

Orphan drugs

Under the Orphan Drug Act, the FDA may grant orphan drug designation to drugs or biologics intended to treat a rare disease or condition, which is generally defined as a disease or condition that affects fewer than 200,000 individuals in the United States. Orphan drug designation must be requested before submitting an NDA or BLA. After the FDA grants orphan drug designation, the generic identity of the drug or biologic and its potential orphan use are disclosed publicly by the FDA. Orphan drug designation does not convey any advantage in, or shorten the duration of, the regulatory review and approval process. The first NDA or BLA applicant to receive FDA approval for a particular active ingredient to treat a particular disease with FDA orphan drug designation is entitled to a seven-year exclusive marketing period in the United States for that product, for that indication. During the seven-year exclusivity period, the FDA may not approve any other applications to market the same drug or biologic for the same orphan indication, except in limited circumstances, such as a showing of clinical superiority to the product with orphan drug exclusivity in that it is shown to be safer, more effective or makes a major contribution to patient care. Orphan drug exclusivity does not prevent the FDA from approving a different drug or biologic for the same disease or condition, or the same drug or biologic for a different disease or condition. Among the other benefits of orphan drug designation are tax credits for certain research and a waiver of the NDA or BLA application user fee.

Pediatric information

Under the Pediatric Research Equity Act of 2003, an NDA, BLA or supplement to an NDA or BLA must contain data that are adequate to assess the safety and effectiveness of the drug or biological product for the claimed indications in all relevant pediatric subpopulations, and to support dosing and administration for each pediatric subpopulation for which the product is safe and effective. The FDA may, on its own initiative or at the request of the applicant, grant deferrals for submission of some or all pediatric data until after approval of the product for use in adults, or full or partial waivers from the pediatric data requirements. Unless otherwise required by regulation, the pediatric data requirements do not apply to products with orphan drug designation.

The Hatch-Waxman Act

Abbreviated new drug applications

In seeking approval for a drug through an NDA, applicants are required to list with the FDA each patent whose claims cover the applicant's product. Upon approval of a drug, each of the patents listed in the application for the drug is then published in the FDA's Approved Drug Products with Therapeutic Equivalence Evaluations, commonly known as the Orange Book. Drugs listed in the Orange Book can, in turn, be cited by potential competitors in support of approval of an abbreviated new drug application, or ANDA. Generally, an ANDA provides for marketing of a drug product that has the same active ingredients in the same strengths and dosage form as the listed drug and has been shown through bioequivalence testing to be therapeutically equivalent to the listed drug. Other than the requirement for bioequivalence testing, ANDA applicants are not required to conduct or submit results of preclinical or clinical tests to prove the safety or effectiveness of their drug product, other than the requirement for bioequivalence testing. Drugs approved in this way are commonly referred to as generic equivalents to the listed drug, and can often be substituted by pharmacists under prescriptions written for the original listed drug.

Table of Contents

The ANDA applicant is required to certify to the FDA concerning any patents listed for the approved product in the FDA's Orange Book. Specifically, the applicant must certify that:

the required patent information has not been filed;

the listed patent has expired;

the listed patent has not expired, but will expire on a particular date and approval is sought after patent expiration; or

the listed patent is invalid or will not be infringed by the new product.

A certification that the new product will not infringe the already approved product's listed patents or that such patents are invalid is called a Paragraph IV certification. If the ANDA applicant does not challenge the listed patents, the ANDA will not be approved until all the listed patents claiming the referenced product have expired.

If the ANDA applicant has provided a Paragraph IV certification to the FDA, the applicant must also send notice of the Paragraph IV certification to the NDA and patent holders once the ANDA has been accepted for filing by the FDA. The NDA and patent holders may then initiate a patent infringement lawsuit in response to the notice of the Paragraph IV certification. The filing of a patent infringement lawsuit within 45 days after the receipt of a Paragraph IV certification automatically prevents the FDA from approving the ANDA until the earlier of 30 months, expiration of the patent, settlement of the lawsuit or a decision in the infringement case that is favorable to the ANDA applicant.

The ANDA also will not be approved until any applicable non-patent exclusivity, such as exclusivity for obtaining approval of a new chemical entity, listed in the Orange Book for the referenced product has expired. Federal law provides a period of five years following approval of a drug containing no previously approved active ingredients during which ANDAs for generic versions of those drugs cannot be received by the FDA unless the submission contains a Paragraph IV challenge to a listed patent, in which case the submission may be made four years following the original product approval. If there is no listed patent in the Orange Book, there may not be a Paragraph IV certification, and thus, no ANDA may be filed before the expiration of the exclusivity period. Federal law provides for a period of three years of exclusivity following approval of a listed drug that contains previously approved active ingredients but is approved in a new dosage form, route of administration or combination, or for a new use, the approval of which was required to be supported by new clinical trials conducted by or for the sponsor, during which the FDA cannot grant effective approval of an ANDA based on that listed drug. Under the Best Pharmaceuticals for Children Act, federal law also provides that periods of patent and non-patent marketing exclusivity listed in the Orange Book for a drug may be extended by six months if the NDA sponsor agrees to conduct and report on pediatric studies identified by the FDA in a written request within the statutory timeframes. Applications under the BPCA are treated as priority applications, with all the benefits that designation confers.

Patent term extension

After NDA approval, owners of relevant drug patents may apply for up to a five year patent term extension. The allowable patent term extension is calculated as half of the drug's testing phase, based on the time between IND application and NDA submission, and all of the review phase, based on the time between NDA submission and

approval up to a maximum of five years. The time can be shortened if the FDA determines that the applicant did not pursue approval with due diligence. The total patent term after the extension may not exceed 14 years.

For patents that might expire during the application phase, the patent owner may request an interim patent term extension. An interim patent term extension increases the patent term by one year and may be renewed up to four times. For each interim patent term extension granted, the post-approval patent term extension is reduced by one year. The director of the United States Patent and Trademark Office must determine that approval of the drug covered by the patent for which a patent term extension is being sought is likely. Interim patent term extensions are not available for a drug for which an NDA has not been submitted.

Table of Contents

Section 505(b)(2) new drug applications

Most drug products obtain FDA marketing approval pursuant to an NDA or an ANDA. A third alternative is a special type of NDA, commonly referred to as a Section 505(b)(2) NDA, which enables the applicant to rely, in part, on the FDA's previous approval of a similar product, or published literature, in support of its application.

Section 505(b)(2) NDAs often provide an alternate path to FDA approval for new or improved formulations or new uses of previously approved products. Section 505(b)(2) permits the filing of an NDA where at least some of the information required for approval comes from studies not conducted by or for the applicant and for which the applicant has not obtained a right of reference. If the Section 505(b)(2) applicant can establish that reliance on the FDA's previous approval is scientifically appropriate, it may eliminate the need to conduct certain preclinical or clinical studies of the new product. The FDA may also require companies to perform additional studies or measurements to support the change from the approved product. The FDA may then approve the new product candidate for all or some of the label indications for which the referenced product has been approved, as well as for any new indication sought by the Section 505(b)(2) applicant.

To the extent that the Section 505(b)(2) applicant is relying on studies conducted for an already approved product, the applicant is required to certify to the FDA concerning any patents listed for the approved product in the Orange Book to the same extent that an ANDA applicant would. As a result, approval of a Section 505(b)(2) NDA can be stalled until all the listed patents claiming the referenced product have expired, until any non-patent exclusivity, such as exclusivity for obtaining approval of a new chemical entity, listed in the Orange Book for the referenced product has expired, and, in the case of a Paragraph IV certification and subsequent patent infringement suit, until the earlier of 30 months, settlement of the lawsuit or a decision in the infringement case that is favorable to the Section 505(b)(2) applicant.

Combination products

A combination product is a product comprised of (i) two or more regulated components (i.e., drug/device, biologic/device, drug/biologic or drug/device/biologic) that are physically, chemically, or otherwise combined or mixed and produced as a single entity; (ii) two or more separate products packaged together in a single package or as a unit and comprised of drug and device products, device and biological products, or biological and drug products; (iii) a drug, device, or biological product packaged separately that according to its investigational plan or proposed labeling is intended for use only with an approved individually specified drug, device, or biological product where both are required to achieve the intended use, indication, or effect and where, upon approval of the proposed product, the labeling of the approved product would need to be changed (e.g., to reflect a change in intended use, dosage form, strength, route of administration, or significant change in dose); or (iv) any investigational drug, device, or biological product packaged separately that according to its proposed labeling is for use only with another individually specified investigational drug, device, or biological product where both are required to achieve the intended use, indication, or effect.

The FDA is divided into various branches, or Centers, by product type. Different Centers typically review drug, biologic or device applications. In order to review an application for a combination product, the FDA must decide which Center should be responsible for the review. FDA regulations require that the FDA determine the combination product's primary mode of action, or PMOA, which is the single mode of a combination product that provides the most important therapeutic action of the combination product. The Center that regulates that portion of the product that generates the PMOA or that has expertise in the relevant therapeutic area becomes the lead evaluator. If there are two independent modes of action, neither of which is subordinate to the other, the FDA makes a determination as to which Center to assign the product based on consistency with other combination products raising similar types of safety and

effectiveness questions or to the Center with the most expertise in evaluating the most significant safety and effectiveness questions raised by the combination product. When evaluating an application, a lead Center may consult other Centers but still retain complete reviewing authority, or it may collaborate with another Center, by which the lead Center assigns review of a specific section of the application to another Center, delegating its review authority for that section. Typically, the FDA requires

Table of Contents

a single marketing application submitted to the Center selected to be the lead evaluator, although the agency has the discretion to require separate applications to more than one Center. One reason to submit multiple evaluations is if the applicant wishes to receive some benefit that accrues only from approval under a particular type of application, like new drug product exclusivity. If multiple applications are submitted, each application may be evaluated by a different lead Center.

Biosimilars law

The Biologics Price Competition and Innovation Act of 2009, or BPCIA, amended the PHSA to create a new licensure framework for biosimilar products, which could ultimately subject our biological products to competition. Under the BPCIA, a manufacturer may submit an application for licensure of a biologic product that is biosimilar to or interchangeable with a referenced, branded biologic product. Previously, there had been no licensure pathway for such biosimilar or interchangeable products. For purposes of the BPCIA, a reference product is defined as the single biological product licensed under a full BLA against which a biological product is evaluated in an application submitted under a follow-on BLA. Biosimilarity sufficient to reference a prior FDA-approved product requires that there be no differences in conditions of use, route of administration, dosage form, and strength, and no clinically meaningful differences between the biological product and the reference product in terms of safety, purity, and potency. Biosimilarity must be shown through analytical studies, animal studies, and at least one clinical study, absent a waiver by the Secretary of the U.S. Department of Health & Human Services. A biosimilar product may be deemed interchangeable with a prior approved product if it meets the higher hurdle of demonstrating that it can be expected to produce the same clinical results as the reference product and, for products administered multiple times, the biologic and the reference biologic may be switched after one has been previously administered without increasing safety risks or risks of diminished efficacy relative to exclusive use of the reference biologic. No biosimilar or interchangeable products have been approved under the BPCIA to date. Complexities associated with the larger, and often more complex, structures of biological products, as well as the process by which such products are manufactured, pose significant hurdles to implementation which are still being evaluated by the FDA.

The BPCIA also created a 12-year period of reference product exclusivity, which can be extended to 12 ½ years with pediatric exclusivity. The 12-year exclusivity period begins on the date of first licensure of the reference product under the PHSA and during which the licensure of a follow-on application for a biosimilar or interchangeable product cannot be made effective. During the first four years (or four and one-half years with pediatric exclusivity) of the 12-year period, an application for a biosimilar or interchangeable version of the reference product cannot be submitted to the FDA.

The BPCIA includes limits on obtaining 12-year reference product exclusivity for certain changes or modifications to the reference product. A separate 12-year reference product exclusivity period does not apply to:

a BLA supplement for the product that is the reference product;

a subsequent BLA filed by the same reference product sponsor or manufacturer (or a licensor, predecessor in interest, or other related entity) for a change (not including a modification to the structure of the biological product) that results in a new indication, route of administration, dosing schedule, dosage form, delivery system, delivery device or strength; or

a modification to the structure of the biological product that does not result in a change in safety, purity or potency.

The FDA has not yet issued proposed regulations setting forth its interpretation of the BPCIA's exclusivity provisions and it is unclear when the FDA will do so.

In addition to creating a 12-year period of reference product exclusivity, the BPCIA clarifies the interaction of that exclusivity with orphan drug exclusivity, such that the licensure of a biosimilar or interchangeable version of a reference product that was designated and approved as an orphan drug may only occur after the later of the

Table of Contents

expiration of any applicable seven-year orphan drug exclusivity or the 12-year reference product exclusivity (or seven and one-half years and 12 ½ years with pediatric exclusivity).

Like pediatric exclusivity applicable to drug products approved under the FDCA, pediatric exclusivity applicable to biological reference products is subject to an exception. Pediatric exclusivity will not apply to either the 12-year reference product or the seven-year orphan drug exclusivity periods if the FDA determines later than nine months prior to the expiration of such period that the study reports a BLA sponsor submitted in response to a written request for pediatric studies met the terms of that request.

Our investigational biological products, if approved, could be considered reference products entitled to 12-year exclusivity. Even if our products are considered to be reference products eligible for exclusivity, another company could market a competing version of any of our biological products if the FDA approves a full BLA for such product containing the sponsor's own preclinical data and data from adequate and well-controlled clinical trials to demonstrate the safety, purity and potency of their product.

The BPCIA also sets forth a complex mechanism for resolving patent disputes that involves a step-wise exchange of information prior to the initiation of a patent infringement lawsuit against a biosimilar or interchangeable product sponsor. Unlike the Hatch-Waxman Act, the BPCIA provides no automatic stay on approval of a biosimilar or interchangeable product application.

Overview of FDA regulation of companion diagnostics

We are developing *in vitro* and *in vivo* companion diagnostics for use in selecting the patients that we believe will respond to our cancer therapeutics.

FDA officials have indicated that the agency intends to publish guidance that, when finalized, would address issues critical to developing *in vitro* companion diagnostics, such as biomarker qualification, establishing clinical validity, the use of retrospective data, the appropriate patient population and when the FDA will require that the device and the drug be approved simultaneously. The draft guidance issued in July 2011 states that if safe and effective use of a therapeutic depends on an *in vitro* diagnostic, then the FDA generally will require approval or clearance of the diagnostic at the same time that the FDA approves the therapeutic. Although still in draft, this guidance represents the FDA's current practice. The FDA has yet to issue final guidance, and it is unclear when it will do so, or what the scope would be.

The FDA previously has required *in vitro* companion diagnostics intended to select the patients who will respond to the cancer treatment to obtain PMA, simultaneously with approval of the drug or licensure of the biologic. Based on the draft guidance, and the FDA's past treatment of companion diagnostics, we believe that the FDA will require one or more of our *in vitro* companion diagnostics to obtain PMA for our companion diagnostics to identify patient populations suitable for our cancer therapies, such as the *in vitro* companion diagnostic for MM-121. The review of these *in vitro* companion diagnostics in conjunction with the review of our cancer treatments involves coordination of review by CDER and by the FDA's Center for Devices and Radiological Health Office of In Vitro Diagnostics and Radiological Health.

Our *in vivo* companion diagnostics, which are in the form of imaging agents, are regulated as drugs by CDER and, as such, are generally subject to the regulatory requirements applicable to other new drug candidates.

PMA pathway

A medical device, including an *in vitro* diagnostic, or IVD, to be commercially distributed in the United States must receive either 510(k) clearance or PMA (or be a Class I exempt device that does not require pre-market review) from the FDA prior to marketing. Devices deemed by the FDA to pose the greatest risk, such as

Table of Contents

life-sustaining, life supporting or implantable devices, or devices deemed not substantially equivalent to a previously 510(k) cleared device or a preamendment class III device for which PMA applications have not been called, are placed in Class III requiring PMA. The PMA pathway requires proof of the safety and effectiveness of the device to the FDA's satisfaction. The PMA pathway generally takes from one to three years or even longer from submission of the application.

A PMA application for an IVD must provide extensive preclinical and clinical trial data. Preclinical data for an IVD includes many different tests, including how reproducible the results are when the same sample is tested multiple times by multiple users at multiple laboratories. The clinical data need to establish that the test is sufficiently safe, effective and reliable in the intended use population. In addition, the FDA must be convinced that a device has clinical utility, meaning that an IVD provides information that is clinically meaningful. A biomarker's clinical significance may be obvious, or the applicant may be able to rely upon published literature or submit data to show clinical utility.

A PMA application also must provide information about the device and its components regarding, among other things, device design, manufacturing and labeling. The sponsor must pay an application fee.

As part of the PMA review, the FDA will typically inspect the manufacturer's facilities for compliance with Quality System Regulation, or QSR, requirements, which impose elaborate design control, testing, control, documentation and other quality assurance procedures.

Upon submission, the FDA determines if the PMA application is sufficiently complete to permit a substantive review, and, if so, the FDA accepts the application for filing. The FDA then commences an in-depth review of the PMA application. The entire process typically takes one to three years, but may take longer. The review time is often significantly extended as a result of the FDA asking for more information or clarification of information already provided. The FDA also may respond with a not approvable determination based on deficiencies in the application and require additional clinical trials that are often expensive and time-consuming and can substantially delay approval.

During the review period, an FDA advisory committee, typically a panel of clinicians, likely will be convened to review the application and recommend to the FDA whether, or upon what conditions, the device should be approved. Although the FDA is not bound by the advisory panel decision, the panel's recommendation is important to the FDA's overall decision making process.

If the FDA's evaluation of the PMA application is favorable, the FDA typically issues an approvable letter requiring the applicant's agreement to specific conditions, such as changes in labeling, or specific additional information, such as submission of final labeling, in order to secure final approval of the PMA. If the FDA concludes that the applicable criteria have been met, the FDA will issue a PMA for the approved indications, which can be more limited than those originally sought by the manufacturer. The PMA can include post-approval conditions that the FDA believes necessary to ensure the safety and effectiveness of the device, including, among other things, restrictions on labeling, promotion, sale and distribution. Failure to comply with the conditions of approval can result in material adverse enforcement action, including the loss or withdrawal of the approval.

Even after approval of a PMA, a new PMA or PMA supplement may be required in the event of a modification to the device, its labeling or its manufacturing process. Supplements to a PMA often require the submission of the same type of information required for an original PMA, except that the supplement is generally limited to the information needed to support the proposed change from the product covered by the original PMA.

Clinical trials

A clinical trial is almost always required to support a PMA application.

All clinical studies of investigational devices must be conducted in compliance with the FDA's requirements. If an investigational device could pose a significant risk to patients pursuant to FDA regulations,

Table of Contents

the FDA must approve an Investigational Device Exemption, or IDE, application prior to initiation of investigational use. IVD trials usually do not require an IDE, as the FDA does not judge them to be a significant risk because the results do not affect the patients in the study. However, for a trial where the IVD result directs the therapeutic care of patients with cancer (companion diagnostics), we believe that the FDA would consider the investigation to present significant risk and require an IDE.

An IDE application must be supported by appropriate data, such as laboratory test results, showing that it is safe to test the device in humans and that the testing protocol is scientifically sound. The FDA typically grants IDE approval for a specified number of patients. A nonsignificant risk device does not require FDA approval of an IDE. Both significant risk and nonsignificant risk investigational devices require approval from IRBs at the study centers where the device will be used.

During the trial, the sponsor must comply with the FDA's IDE requirements for investigator selection, trial monitoring, reporting and record keeping. The investigators must obtain patient informed consent, rigorously follow the investigational plan and study protocol, control the disposition of investigational devices and comply with all reporting and record keeping requirements. Prior to granting PMA, the FDA typically inspects the records relating to the conduct of the study and the clinical data supporting the PMA application for compliance with applicable requirements.

Although the QSR does not fully apply to investigational devices, the requirement for controls on design and development does apply. The sponsor also must manufacture the investigational device in conformity with the quality controls described in the IDE application and any conditions of IDE approval that the FDA may impose with respect to manufacturing.

Post-market

After a device is on the market, numerous regulatory requirements apply. These requirements include: the QSR, labeling regulations, the FDA's general prohibition against promoting products for unapproved or off label uses, the Medical Device Reporting regulation, which requires that manufacturers report to the FDA if their device may have caused or contributed to a death or serious injury or malfunctioned in a way that would likely cause or contribute to a death or serious injury if it were to recur, and the Reports of Corrections and Removals regulation, which requires manufacturers to report recalls and field actions to the FDA if initiated to reduce a risk to health posed by the device or to remedy a violation of the FDCA.

The FDA enforces these requirements by inspection and market surveillance. If the FDA finds a violation, it can institute a wide variety of enforcement actions, ranging from a public warning letter to more severe sanctions such as: fines, injunctions and civil penalties; recall or seizure of products; operating restrictions, partial suspension or total shutdown of production; refusing requests for PMA of new products; withdrawing PMAs already granted; and criminal prosecution.

Other regulatory requirements

Any drug or biological products manufactured or distributed by us pursuant to FDA approvals are subject to pervasive and continuing regulation by the FDA, including, among other things, requirements relating to recordkeeping, periodic reporting, product sampling and distribution, advertising and promotion and reporting of adverse experiences with the product. After approval, most changes to the approved product, such as adding new indications or other labeling claims are subject to prior FDA review and approval.

The FDA may impose a number of post-approval requirements as a condition of approval of an NDA or BLA. For example, the FDA may require post-marketing testing, including phase 4 clinical trials, and surveillance to further assess and monitor the product's safety and effectiveness after commercialization.

Table of Contents

Regulatory approval of oncology products often requires that patients in clinical trials be followed for long periods to determine the OS benefit of the drug or biologic.

In addition, drug and biologic manufacturers and other entities involved in the manufacture and distribution of approved drugs and biological products are required to register their establishments with the FDA and state agencies, and are subject to periodic unannounced inspections by the FDA and these state agencies for compliance with cGMP requirements. Changes to the manufacturing process are strictly regulated and often require prior FDA approval before being implemented. FDA regulations also require investigation and correction of any deviations from cGMP and impose reporting and documentation requirements upon us and any third-party manufacturers that we may decide to use. Accordingly, manufacturers must continue to expend time, money and effort in the areas of production and quality control to maintain cGMP compliance.

Once an approval is granted, the FDA may withdraw the approval if compliance with regulatory requirements and standards is not maintained or if problems occur after the product reaches the market. Later discovery of previously unknown problems with a product, including adverse events of unanticipated severity or frequency, or with manufacturing processes, or failure to comply with regulatory requirements, may result in revisions to the approved labeling to add new safety information, imposition of post-market studies or clinical trials to assess new safety risks or imposition of distribution or other restrictions under a Risk Evaluation and Mitigation Strategy program. Other potential consequences include, among other things:

restrictions on the marketing or manufacturing of the product, complete withdrawal of the product from the market or product recalls;

fines, untitled and warning letters or holds on post-approval clinical trials;

refusal of the FDA to approve pending applications or supplements to approved applications, or suspension or revocation of product license approvals;

product seizure or detention, or refusal to permit the import or export of products; or

consent decrees, injunctions or the imposition of civil or criminal prosecution.

The FDA strictly regulates marketing, labeling, advertising and promotion of products that are placed on the market. Drugs and biologics may be promoted only for the approved indications and in accordance with the provisions of the approved label. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off label uses, and a company that is found to have improperly promoted off label uses may be subject to significant liability.

Additional provisions

Anti-kickback and false claims laws

In addition to FDA restrictions on marketing of pharmaceutical products, several other types of state and federal laws have been applied to restrict certain marketing practices in the pharmaceutical industry in recent years. These laws include anti-kickback statutes and false claims statutes. The federal healthcare program anti-kickback statute prohibits, among other things, knowingly and willfully offering, paying, soliciting or receiving remuneration to induce or in return for purchasing, leasing, ordering or arranging for the purchase, lease or order of any healthcare item or service reimbursable under Medicare, Medicaid or other federally financed healthcare programs. The Patient Protection and Affordable Care Act, or the PPACA, amended the intent element of the federal statute so that a person or entity no longer needs to have actual knowledge of the statute or specific intent to violate it. This statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on the one hand and prescribers, purchasers and formulary managers on the other. Violations of the anti-kickback statute are punishable by imprisonment, criminal fines, civil monetary penalties and exclusion from participation in federal healthcare programs. Although there are a number of statutory exemptions and regulatory safe harbors

Table of Contents

protecting certain common activities from prosecution or other regulatory sanctions, the exemptions and safe harbors are drawn narrowly, and practices that involve remuneration intended to induce prescribing, purchases or recommendations may be subject to scrutiny if they do not qualify for an exemption or safe harbor.

Federal false claims laws prohibit any person from knowingly presenting, or causing to be presented, a false claim for payment to the federal government, or knowingly making, or causing to be made, a false statement to have a false claim paid. Recently, several pharmaceutical and other healthcare companies have been prosecuted under these laws for allegedly inflating drug prices they report to pricing services, which in turn were used by the government to set Medicare and Medicaid reimbursement rates, and for allegedly providing free product to customers with the expectation that the customers would bill federal programs for the product. In addition, certain marketing practices, including off-label promotion, may also violate false claims laws. Additionally, the PPACA amended the federal false claims law such that a violation of the federal healthcare program anti-kickback statute can serve as a basis for liability under the federal false claims law. The majority of states also have statutes or regulations similar to the federal anti-kickback law and false claims laws, which apply to items and services reimbursed under Medicaid and other state programs, or, in several states, apply regardless of the payor.

Physician drug samples

As part of the sales and marketing process, pharmaceutical companies frequently provide samples of approved drugs to physicians. The Prescription Drug Marketing Act, or the PDMA, imposes requirements and limitations upon the provision of drug samples to physicians, as well as prohibits states from licensing distributors of prescription drugs unless the state licensing program meets certain federal guidelines that include minimum standards for storage, handling and record keeping. In addition, the PDMA sets forth civil and criminal penalties for violations.

Foreign regulation

In order to market any therapeutic or diagnostic product outside of the United States, we would need to comply with numerous and varying regulatory requirements of other countries regarding safety and efficacy and governing, among other things, clinical trials, marketing authorization, commercial sales and distribution of our products. Whether or not we obtain FDA approval for a product, we would need to obtain the necessary approvals by the comparable regulatory authorities of foreign countries before we can commence clinical trials or marketing of the product in those countries. The approval process varies from country to country and can involve additional product testing and additional administrative review periods. The time required to obtain approval in other countries might differ from and be longer than that required to obtain FDA approval. Regulatory approval in one country does not ensure regulatory approval in another, but a failure or delay in obtaining regulatory approval in one country may negatively impact the regulatory process in others.

To date, other than applying for and being granted orphan medicinal product designation and obtaining advice from the Scientific Advice Working Party of the EMA in the European Union for MM-398 for the treatment of pancreatic cancer, we have not initiated any discussions with the EMA or any other foreign regulatory authorities with respect to seeking regulatory approval for any of our products in Europe or in any other country outside the United States.

The EMA grants orphan medicinal product designation to promote the development of products that may offer therapeutic benefits for life-threatening or chronically debilitating conditions affecting not more than five in 10,000 people in the European Union. In addition, orphan medicinal product designation can be granted if the drug is intended for a life threatening, seriously debilitating or serious and chronic condition and without incentives it is unlikely that sales of the drug in the European Union would be sufficient to justify developing the drug. Orphan medicinal product designation is only available if there is no other satisfactory method approved in the European

Union of diagnosing, preventing or treating the condition, or if such a method exists, the proposed orphan medicinal product will be of significant benefit to patients. Orphan medicinal product designation provides opportunities for

Table of Contents

free protocol assistance and fee reductions for access to the centralized regulatory procedures. Orphan medicinal product designation also provides ten years of market exclusivity following drug approval. The exclusivity period may be reduced to six years if the designation criteria are no longer met, including where it is shown that the product is sufficiently profitable not to justify maintenance of market exclusivity.

New legislation and regulations

From time to time, legislation is drafted, introduced and passed in Congress that could significantly change the statutory provisions governing the testing, approval, manufacturing and marketing of products regulated by the FDA. For example, the BPCIA and the Food and Drug Administration Safety and Innovation Act, or the FDASIA, were enacted in 2010 and 2012, respectively. The FDASIA is a broad, sweeping law that establishes new user fee programs and provides the FDA with new authority in the areas of drugs, biologics and medical devices. In particular, the FDASIA provides the FDA with new inspection authorities. A drug or biologic will be considered adulterated, with possible resulting civil and criminal penalties, if the owner or operator of the establishment where it is made, processed, packed or held delays, denies, limits or refuses inspection. The FDASIA also replaces the biennial inspection schedule for drugs and biologics with a risk-based inspection schedule. The law grants the FDA authority to require a drug or biologics manufacturer to provide, in advance or instead of an inspection, and at the manufacturer's expense, any records or other information that the agency may otherwise inspect at the facility. The FDASIA also permits the FDA to share inspection information with foreign governments under certain circumstances. The FDASIA also provides the FDA with additional authority to exercise against manufacturers of drugs or biologics that are not adhering to pediatric study requirements, which apply even if the manufacturer is not seeking to market the drug or biologic to pediatric patients. As of April 2013, the FDA must issue non-compliance letters to companies who do not meet the pediatric study requirements. The company has an opportunity to respond, and the non-compliance letter and company response will become publicly available. The FDASIA is complex and has yet to be interpreted and implemented by the FDA. In the area of companion diagnostics, FDA officials indicated in 2010 that the agency planned to issue two guidances in this area. The FDA issued one draft guidance in July 2011. The FDA has yet to issue a second draft guidance and may decide not to issue a second draft guidance or finalize the existing draft guidance. As a result, its ultimate impact, implementation and meaning are subject to uncertainty.

In addition to new legislation, FDA regulations and policies are often revised or interpreted by the agency in ways that may significantly affect our business and our products. It is impossible to predict whether further legislative changes will be enacted or whether FDA regulations, guidance, policies or interpretations changed or what the effect of such changes, if any, may be.

Pharmaceutical coverage, pricing and reimbursement

Significant uncertainty exists as to the coverage and reimbursement status of any drug products for which we obtain regulatory approval. Sales of any of our product candidates, if approved, will depend, in part, on the extent to which the costs of the products will be covered by third-party payors, including government health programs such as Medicare and Medicaid, commercial health insurers and managed care organizations. The process for determining whether a payor will provide coverage for a drug product may be separate from the process for setting the price or reimbursement rate that the payor will pay for the drug product once coverage is approved. Third-party payors may limit coverage to specific drug products on an approved list, or formulary, which might not include all of the approved drugs for a particular indication.

In order to secure coverage and reimbursement for any product that might be approved for sale, we may need to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of the product, in addition to the costs required to obtain FDA or other comparable regulatory approvals. Our product

candidates may not be considered medically necessary or cost-effective. A payor's decision to provide coverage for a drug product does not imply that an adequate reimbursement rate will be approved. Third-party reimbursement may not be sufficient to enable us to maintain price levels high enough to realize an appropriate return on our investment in product development.

Table of Contents

The containment of healthcare costs has become a priority of federal, state and foreign governments, and the prices of drugs have been a focus in this effort. Third-party payors are increasingly challenging the prices charged for medical products and services and examining the medical necessity and cost-effectiveness of medical products and services, in addition to their safety and efficacy. If these third-party payors do not consider our products to be cost-effective compared to other available therapies, they may not cover our products after approval as a benefit under their plans or, if they do, the level of payment may not be sufficient to allow us to sell our products at a profit. The U.S. government, state legislatures and foreign governments have shown significant interest in implementing cost containment programs to limit the growth of government-paid health care costs, including price controls, restrictions on reimbursement and requirements for substitution of generic products for branded prescription drugs. Adoption of such controls and measures, and tightening of restrictive policies in jurisdictions with existing controls and measures, could limit payments for pharmaceuticals such as the drug candidates that we are developing and could adversely affect our net revenue and results.

Pricing and reimbursement schemes vary widely from country to country. Some countries provide that drug products may be marketed only after a reimbursement price has been agreed. Some countries may require the completion of additional studies that compare the cost-effectiveness of a particular product candidate to currently available therapies. For example, the European Union provides options for its member states to restrict the range of drug products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. European Union member states may approve a specific price for a drug product or may instead adopt a system of direct or indirect controls on the profitability of the company placing the drug product on the market. Other member states allow companies to fix their own prices for drug products, but monitor and control company profits. The downward pressure on health care costs in general, particularly prescription drugs, has become very intense. As a result, increasingly high barriers are being erected to the entry of new products. In addition, in some countries, cross-border imports from low-priced markets exert competitive pressure that may reduce pricing within a country. There can be no assurance that any country that has price controls or reimbursement limitations for drug products will allow favorable reimbursement and pricing arrangements for any of our products.

The marketability of any products for which we receive regulatory approval for commercial sale may suffer if the government and third-party payors fail to provide adequate coverage and reimbursement. In addition, an increasing emphasis on managed care in the United States has increased and we expect will continue to increase the pressure on drug pricing. Coverage policies, third-party reimbursement rates and drug pricing regulation may change at any time. In particular, the Patient Protection and Affordable Care Act was enacted in the United States in March 2010 and contains provisions that may reduce the profitability of drug products, including, for example, increased rebates for drugs sold to Medicaid programs, extension of Medicaid rebates to Medicaid managed care plans, mandatory discounts for certain Medicare Part D beneficiaries and annual fees based on pharmaceutical companies' share of sales to federal health care programs. Even if favorable coverage and reimbursement status is attained for one or more products for which we receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

Employees

As of January 31, 2014, we had 254 full-time employees, including a total of 86 employees with M.D. or Ph.D. degrees. Of these full-time employees, 216 employees are engaged in research, development and manufacturing. None of our employees is represented by a labor union or covered by collective bargaining agreements. We consider our relationship with our employees to be good.

Our Corporate Information

We were originally incorporated in the Commonwealth of Massachusetts in 1993 and reincorporated under the laws of the State of Delaware in October 2010. Our principal executive offices are located at One Kendall Square, Suite B7201, Cambridge, MA 02139, and our telephone number is (617) 441-1000.

Table of Contents

Information Available on the Internet

We maintain a website with the address *www.merrimackpharma.com*. We are not including the information contained on our website as a part of, or incorporating it by reference into, this Annual Report on Form 10-K. Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and all amendments to those reports, are available to you free of charge through the SEC Filings section of our website as soon as reasonably practicable after those materials have been electronically filed with, or furnished to, the Securities and Exchange Commission, or the SEC. We also make available on our website our corporate governance guidelines, the charters for our audit committee, corporate governance and nominating committee, organization and compensation committee and executive committee, and our code of business conduct and ethics, which applies to our directors, officers and employees, and such information is available in print and free of charge to any of our stockholders who requests it. In addition, we intend to disclose on our website any amendments to, or waivers from, our code of business conduct and ethics that are required to be publicly disclosed pursuant to rules of the SEC.

Table of Contents

Item 1A. Risk Factors

Risks Related to Our Financial Position and Need for Additional Capital

We have incurred significant losses since our inception. We expect to incur losses for the foreseeable future and may never achieve or maintain profitability.

Since inception, we have incurred significant operating losses. Our net loss was \$130.7 million for the year ended December 31, 2013, \$91.8 million for the year ended December 31, 2012 and \$79.7 million for the year ended December 31, 2011. As of December 31, 2013, we had an accumulated deficit of \$572.2 million. To date, we have financed our operations primarily through private placements of our convertible preferred stock, collaborations, public offerings of our securities and a secured debt financing. We have devoted substantially all of our efforts to research and development, including clinical trials. We have not completed development of or commercialized any therapeutic product candidates or companion diagnostics. We expect to continue to incur significant expenses and increasing operating losses for at least the next several years. We anticipate that our expenses will increase substantially as we:

initiate or continue clinical trials of our six most advanced product candidates;

continue the research and development of our other product candidates;

seek to discover additional product candidates;

seek regulatory approvals for our product candidates that successfully complete clinical trials;

establish a sales, marketing and distribution infrastructure and scale up manufacturing capabilities to commercialize products for which we may obtain regulatory approval; and

add operational, financial and management information systems and personnel, including personnel to support our product development and planned commercialization efforts.

To become and remain profitable, we must succeed in developing and eventually commercializing products with significant market potential. This will require us to be successful in a range of challenging activities, including discovering product candidates, completing preclinical testing and clinical trials of our product candidates, obtaining regulatory approval for these product candidates and manufacturing, marketing and selling those products for which we may obtain regulatory approval. We are only in the preliminary stages of some of these activities. We may never succeed in these activities and may never generate revenues that are significant or large enough to achieve profitability. Even if we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis. Our failure to become and remain profitable would depress the value of our company and could impair our ability to raise capital, expand our business, diversify our product offerings or continue our operations. A decline in the value of our company could also cause you to lose all or part of your investment.

Our substantial indebtedness may limit cash flow available to invest in the ongoing needs of our business.

We have, and will continue to have, a significant amount of indebtedness. As of December 31, 2013, we had outstanding borrowings in an aggregate principal amount of \$40.0 million under a Loan and Security Agreement, or Loan Agreement, with Hercules Technology Growth Capital, Inc., or Hercules. In addition, on July 17, 2013, we issued \$125.0 million aggregate principal amount of 4.50% convertible senior notes due 2020. We could in the future incur additional indebtedness beyond such amounts.

Our substantial debt combined with our other financial obligations and contractual commitments could have significant adverse consequences, including:

requiring us to dedicate a substantial portion of cash flow from operations to the payment of interest on, and principal of, our debt, which will reduce the amounts available to fund working capital, capital expenditures, product development efforts and other general corporate purposes;

increasing our vulnerability to adverse changes in general economic, industry and market conditions;

Table of Contents

obligating us to restrictive covenants that may reduce our ability to take certain corporate actions or obtain further debt or equity financing;

limiting our flexibility in planning for, or reacting to, changes in our business and the industry in which we compete; and

placing us at a competitive disadvantage compared to our competitors that have less debt or better debt servicing options.

In addition, we are vulnerable to increases in the market rate of interest because our currently outstanding secured debt bears interest at a variable rate. If the market rate of interest increases, we will have to pay additional interest on our outstanding debt, which would reduce cash available for our other business needs.

We intend to satisfy our current and future debt service obligations with our existing cash and cash equivalents and available-for-sale securities and funds from external sources. However, we may not have sufficient funds or may be unable to arrange for additional financing to pay the amounts due under our existing debt. Funds from external sources may not be available on acceptable terms, if at all. In addition, a failure to comply with the covenants under our existing debt instruments could result in an event of default under those instruments. In the event of an acceleration of amounts due under our debt instruments as a result of an event of default, including upon the occurrence of an event that would reasonably be expected to have a material adverse effect on our business, operations, properties, assets or condition or a failure to pay any amount due, we may not have sufficient funds or may be unable to arrange for additional financing to repay our indebtedness or to make any accelerated payments, and the lenders could seek to enforce security interests in the collateral securing such indebtedness. In addition, the covenants under our existing debt instruments and the pledge of our assets as collateral limit our ability to obtain additional debt financing.

Servicing our debt requires a significant amount of cash, and we may not have sufficient cash flow from our business to pay our obligations.

Our ability to make scheduled payments of the principal of, to pay interest on or to refinance our indebtedness depends on our future performance, which is subject to economic, financial, competitive and other factors beyond our control. We currently do not generate cash flow from operations and, in the future, our business may not generate cash flow from operations, sufficient to service our debt and make necessary capital expenditures. If we are unable to generate cash flow, we may be required to adopt one or more alternatives, such as selling assets, restructuring debt or obtaining additional equity or debt financing on terms that may be unfavorable to us or highly dilutive. Our ability to refinance our indebtedness will depend on the capital markets and our financial condition at such time. We may not be able to engage in any of these activities at all or engage in these activities on desirable terms, which could result in a default on our debt obligations or future indebtedness.

We will need substantial additional funding. If we are unable to raise capital when needed, we would be forced to delay, reduce or eliminate our product development programs or commercialization efforts.

We will need substantial additional funding in connection with our continuing operations. We expect our research and development expenses to continue to increase in connection with our ongoing activities, particularly as we continue the research, development and clinical trials of, and seek regulatory approval for, our product candidates. In addition, in connection with seeking and possibly obtaining regulatory approval of any of our product candidates, we expect to incur significant commercialization expenses for product sales, marketing, manufacturing and distribution. If we are unable to raise capital when needed or on attractive terms, we would be forced to delay, reduce or eliminate our

research and development programs or commercialization efforts.

We expect that our existing unrestricted cash and cash equivalents and available-for-sale securities as of December 31, 2013, anticipated interest income and funding under our license and collaboration agreement with Sanofi related to MM-121 will enable us to fund operations into 2015. In the event that we obtain favorable

Table of Contents

results from our Phase 3 clinical trial of MM-398, we expect that anticipated additional expenses in 2014 related to the commercialization of MM-398 will be offset by cash received from potential collaboration opportunities. Our future capital requirements will depend on many factors, including:

the progress and results of the clinical trials of our six most advanced product candidates;

the success of our collaborations with Sanofi related to MM-121 and PharmaEngine related to MM-398;

the scope, progress, results and costs of preclinical development, laboratory testing and clinical trials for our other product candidates;

the costs, timing and outcome of regulatory review of our product candidates;

the costs of commercialization activities, including product sales, marketing, manufacturing and distribution;

the costs of preparing, filing and prosecuting patent applications and maintaining, enforcing and defending intellectual property-related claims;

the extent to which we acquire or invest in businesses, products and technologies;

our ability to establish and maintain commercial manufacturing arrangements for the manufacture of drug product on behalf of third-party pharmaceutical companies; and

our ability to establish and maintain additional collaborations on favorable terms, particularly marketing and distribution arrangements for oncology product candidates outside the United States and Europe.

Conducting preclinical testing and clinical trials is a time-consuming, expensive and uncertain process that takes years to complete, and we may never generate the necessary data required to obtain regulatory approval and achieve product sales. In addition, our product candidates, if approved, may not achieve commercial success. Our commercial revenues, if any, will be derived from sales of products that we do not expect to be commercially available for several years, if at all. Accordingly, we will need to continue to rely on additional financing to achieve our business objectives.

Raising additional capital may cause dilution to our existing stockholders, restrict our operations or require us to relinquish rights to our technologies or product candidates.

Until such time, if ever, as we can generate substantial product revenues, we expect to finance our cash needs through a combination of equity offerings, debt financings, collaborations, strategic alliances, licensing arrangements and other marketing and distribution arrangements. We do not have any committed external source of funds, other than

our collaboration with Sanofi for the development and commercialization of MM-121, which is terminable by Sanofi for convenience upon 180 days prior written notice. Other sources of funds may not be available or, if available, may not be available on terms satisfactory to us and could result in significant stockholder dilution. On July 17, 2013, we sold an aggregate of 5,750,000 shares of our common stock at a price to the public of \$5.00 per share and issued \$125.0 million aggregate principal amount of 4.50% convertible senior notes due 2020 in concurrent underwritten public offerings. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interest of our existing common stockholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our stockholders. Additional debt financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends, and these covenants may also require us to attain certain levels of financial performance and we may not be able to do so; any such failure may result in the acceleration of such debt and the foreclosure by our creditors on the collateral we used to secure the debt. The debt issued in a debt financing would also be senior to our outstanding shares of capital stock, and may rank equally with or senior to the convertible senior notes upon our liquidation. Our existing indebtedness and the pledge of our assets

Table of Contents

as collateral limit our ability to obtain additional debt financing. If we raise additional funds through marketing and distribution arrangements or other collaborations, strategic alliances or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or to grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings when needed, we may be required to delay, limit, reduce or terminate our product development or commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

Our investments are subject to risks that could result in losses.

We invest our cash in a variety of financial instruments, principally securities issued by the U.S. government and its agencies, investment grade corporate bonds, including commercial paper, and money market instruments. All of these investments are subject to credit, liquidity, market and interest rate risk. Such risks, including the failure or severe financial distress of the financial institutions that hold our cash, cash equivalents and investments, may result in a loss of liquidity, impairment to our investments, realization of substantial future losses, or a complete loss of the investments in the long-term, which may have a material adverse effect on our business, results of operations, liquidity and financial condition. In order to manage the risk to our investments, we maintain an investment policy that, among other things, limits the amount that we may invest in any one issue or any single issuer and requires us to only invest in high credit quality securities.

Risks Related to the Development and Commercialization of Our Product Candidates

We depend heavily on the success of our six most advanced product candidates. All of our product candidates are still in preclinical and clinical development. Clinical trials of our product candidates may not be successful. If we are unable to commercialize our product candidates, or experience significant delays in doing so, our business will be materially harmed.

We have invested a significant portion of our efforts and financial resources in the acquisition of rights to MM-398 and the development of our five other most advanced product candidates for the treatment of various types of cancer. All of our therapeutic product candidates are still in preclinical and clinical development. Our ability to generate product revenues, which we do not expect will occur until 2015 at the earliest, if ever, will depend heavily on the successful development and eventual commercialization of these product candidates. The success of our product candidates, which include both our therapeutic product candidates and companion diagnostic candidates, will depend on several factors, including the following:

successful enrollment in, and completion of, preclinical studies and clinical trials;

receipt of marketing approvals from the FDA and similar regulatory authorities outside the United States for our product candidates, including our companion diagnostics;

establishing commercial manufacturing capabilities, either by building such facilities ourselves or making arrangements with third-party manufacturers;

launching commercial sales of any approved products, whether alone or in collaboration with others;

acceptance of any approved products by patients, the medical community and third-party payors;

effectively competing with other therapies;

a continued acceptable safety profile of any products following approval; and

qualifying for, maintaining, enforcing and defending intellectual property rights and claims.

If we do not achieve one or more of these factors in a timely manner or at all, we could experience significant delays or an inability to successfully commercialize our product candidates, which would materially harm our business.

Table of Contents

If clinical trials of our product candidates fail to demonstrate safety and efficacy to the satisfaction of the FDA or similar regulatory authorities outside the United States or do not otherwise produce positive results, we may incur additional costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of our product candidates.

Before obtaining regulatory approval for the sale of our product candidates, we must conduct extensive clinical trials to demonstrate the safety and efficacy of our product candidates in humans. Clinical testing is expensive, difficult to design and implement, can take many years to complete and is uncertain as to outcome. A failure of one or more of our clinical trials can occur at any stage of testing. The outcome of preclinical testing and early clinical trials may not be predictive of the success of later clinical trials, and successful interim results of a clinical trial do not necessarily predict successful final results.

We may experience numerous unexpected events during, or as a result of, clinical trials that could delay or prevent our ability to receive regulatory approval or commercialize our product candidates, including:

regulators or institutional review boards may not authorize us or our investigators to commence a clinical trial or conduct a clinical trial at a prospective trial site;

clinical trials of our product candidates may produce negative or inconclusive results, and we may decide, or regulators may require us, to conduct additional clinical trials or abandon product development programs;

the number of patients required for clinical trials of our product candidates may be larger than we anticipate, enrollment in these clinical trials may be insufficient or slower than we anticipate or patients may drop out of these clinical trials at a higher rate than we anticipate;

our third-party contractors may fail to comply with regulatory requirements or meet their contractual obligations to us in a timely manner, or at all;

we might have to suspend or terminate clinical trials of our product candidates for various reasons, including a finding of a lack of clinical response or a finding that the patients are being exposed to unacceptable health risks;

regulators or institutional review boards may require that we or our investigators suspend or terminate clinical research for various reasons, including noncompliance with regulatory requirements;

the cost of clinical trials of our product candidates may be greater than we anticipate;

the supply or quality of our product candidates, companion diagnostics or other materials necessary to conduct clinical trials of our product candidates may be insufficient or inadequate; and

our product candidates may have undesirable side effects or other unexpected characteristics, causing us or our investigators to suspend or terminate the trials.

For example, in a Phase 2 clinical trial of MM-121 in patients with non-small cell lung cancer, two of the three cohorts (Groups A and C) failed to meet their primary endpoints, and the third cohort (Group B) did not pass its planned interim analysis and will no longer be enrolling patients. Additionally, we did not meet the primary endpoints in our Phase 2 clinical trials of MM-121 in patients with ovarian cancer or in patients with breast cancer, although our ongoing biomarker analysis in each trial identified a potential subpopulation of patients benefiting from MM-121 in combination with either paclitaxel or exemestane, respectively.

Preclinical and clinical data may not be predictive of the success of later clinical trials, and are often susceptible to varying interpretations and analyses. Many companies that have believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval of their products. For instance, the favorable results from a Phase 2 clinical trial of MM-398 in patients with metastatic pancreatic cancer may not be predictive of success in our Phase 3 clinical trial of MM-398 for the same indication, in particular because the trials have different efficacy endpoints and the Phase 2 clinical trial

Table of Contents

was a single arm study that did not compare MM-398 to other therapies. Our Phase 3 clinical trial, as amended, is designed to compare the efficacy of each of MM-398 as a monotherapy and MM-398 in combination with 5-FU and leucovorin against a common control of the combination of 5-FU and leucovorin. This Phase 3 clinical trial is based on an efficacy endpoint of statistically significant difference in OS.

If we are required to conduct additional clinical trials or other testing of our product candidates beyond those that we currently contemplate, if we are unable to successfully complete clinical trials of our product candidates or other testing, if the results of these trials or tests are not positive or are only modestly positive or if there are safety concerns, we may:

be delayed in obtaining marketing approval for our product candidates;

not obtain marketing approval at all;

obtain approval for indications that are not as broad as intended;

have the product removed from the market after obtaining marketing approval;

be subject to additional post-marketing testing requirements;

be subject to restrictions on how the product is distributed or used; or

be unable to obtain reimbursement for use of the product.

In particular, it is possible that the FDA and other regulatory agencies may not consider the results of our Phase 3 clinical trial of MM-398 for the treatment of patients with metastatic pancreatic cancer, once completed, to be sufficient for approval of MM-398 for this indication. In general, the FDA suggests two adequate and well-controlled clinical trials to demonstrate effectiveness because a conclusion based on two persuasive studies will be more secure. Although the FDA informed us that the original design of our Phase 3 clinical trial of MM-398, plus supportive Phase 2 data obtained to date, could potentially provide sufficient safety and effectiveness data for the treatment of patients with metastatic pancreatic cancer, the FDA has further advised us that whether one or two adequate and well controlled clinical trials will be required will be a review issue in connection with an NDA submission. Even if we achieve favorable results in our Phase 3 clinical trial, the FDA may nonetheless require that we conduct additional clinical trials, possibly using a different design.

Delays in testing or approvals may result in increases to our product development costs. We do not know whether any clinical trials will begin as planned, will need to be restructured or will be completed on schedule, or at all.

Significant clinical trial delays also could shorten any periods during which we may have the exclusive right to commercialize our product candidates or allow our competitors to bring products to market before we do and impair our ability to commercialize our product candidates and may harm our business and results of operations.

If serious adverse or undesirable side effects are identified during the development of our product candidates, we may need to abandon our development of some of our product candidates.

All of our product candidates are still in preclinical or clinical development and their risk of failure is high. It is impossible to predict when or if any of our product candidates will prove effective or safe in humans or will receive regulatory approval. Currently marketed therapies for solid tumors are generally limited to some extent by their toxicity. Use of our product candidates as monotherapies in clinical trials also has resulted in adverse events consistent in nature with other marketed therapies. When used in combination with other marketed or investigational therapies, our product candidates may exacerbate adverse events associated with the other therapy. If our product candidates, either alone or in combination with other therapies, result in undesirable side effects or have characteristics that are unexpected, we may need to modify or abandon their development.

Table of Contents

If we experience delays in the enrollment of patients in our clinical trials, our receipt of necessary regulatory approvals could be delayed or prevented.

We may not be able to initiate or continue clinical trials for our product candidates if we are unable to locate and enroll a sufficient number of eligible patients to participate in these trials as required by the FDA or other regulatory authorities. In addition, many of our competitors have ongoing clinical trials for product candidates that could be competitive with our product candidates. Patients who would otherwise be eligible for our clinical trials may instead enroll in clinical trials of our competitors' product candidates or rely upon treatment with existing therapies that may preclude them from eligibility for our clinical trials.

Enrollment delays in our clinical trials may result in increased development costs for our product candidates, which would cause the value of the company to decline and limit our ability to obtain additional financing. Our inability to enroll a sufficient number of patients for any of our current or future clinical trials would result in significant delays or may require us to abandon one or more clinical trials altogether.

In general, we forecast enrollment for our clinical trials based on experience from previous clinical trials and monitor enrollment to be able to make adjustments to clinical trials when appropriate, including as a result of slower than expected enrollment that we experience from time to time in our clinical trials. For example, we experienced slower than expected enrollment in our Phase 2 clinical trial of MM-121 in combination with exemestane for hormone receptor positive breast cancer. In response, we revised the entry criteria for the clinical trial to correspond with changes in clinical practice and also expanded the number of sites and countries participating in the clinical trial. It is possible that slow enrollment in other clinical trials in the future could require us to make similar adjustments. If these adjustments do not overcome problems with slow enrollment, we could experience significant delays or abandon the applicable clinical trial altogether.

If we are unable to successfully develop companion diagnostics for our therapeutic product candidates, or experience significant delays in doing so, we may not realize the full commercial potential of our therapeutics.

An important component of our business strategy is to develop *in vitro* or *in vivo* companion diagnostics for each of our therapeutic product candidates. There has been limited success to date industry-wide in developing companion diagnostics, in particular *in vitro* companion diagnostics. To be successful, we will need to address a number of scientific, technical, regulatory and logistical challenges.

Although we have developed prototype assays for some *in vitro* diagnostic candidates, all of our companion diagnostic candidates are in preclinical development or clinical feasibility testing. We have limited experience in the development of diagnostics and may not be successful in developing appropriate diagnostics to pair with any of our therapeutic product candidates that receive marketing approval. The FDA and similar regulatory authorities outside the United States are generally expected to regulate *in vitro* companion diagnostics as medical devices and *in vivo* companion diagnostics as drugs. In each case, companion diagnostics require separate regulatory approval prior to commercialization. Given our limited experience in developing diagnostics, we expect to rely in part on third parties for their design, development and manufacture. If we, or any third parties that we engage to assist us, are unable to successfully develop companion diagnostics for our therapeutic product candidates, or experience delays in doing so, the development of our therapeutic product candidates may be adversely affected, our therapeutic product candidates may not receive marketing approval and we may not realize the full commercial potential of any therapeutics that receive marketing approval. As a result, our business would be harmed, possibly materially.

Table of Contents

Even if any of our product candidates, including our six most advanced product candidates, receive regulatory approval, they may fail to achieve the degree of market acceptance by physicians, patients, healthcare payors and others in the medical community necessary for commercial success.

If any of our product candidates, including our six most advanced product candidates, receive marketing approval, they may nonetheless not gain sufficient market acceptance by physicians, patients, healthcare payors and others in the medical community. If these products do not achieve an adequate level of acceptance, we may not generate significant product revenues and we may not become profitable. The degree of market acceptance of our product candidates, if approved for commercial sale, will depend on a number of factors that may be uncertain or subjective, including:

the prevalence and severity of any side effects;

efficacy and potential advantages or disadvantages compared to alternative treatments;

the price we charge for our product candidates;

convenience and ease of administration compared to alternative treatments;

the willingness of the target patient population to try new therapies and of physicians to prescribe these therapies;

our ability to successfully develop companion diagnostics that effectively identify patient populations likely to benefit from treatment with our therapeutic products;

the strength of marketing and distribution support; and

sufficient third-party coverage or reimbursement.

If we are unable to establish sales and marketing capabilities or enter into agreements with third parties to sell and market our product candidates, we may not be successful in commercializing our product candidates.

We do not have a sales or marketing infrastructure and have no experience in the sale, marketing or distribution of therapeutic products. To achieve commercial success for any approved product, we must either develop a sales and marketing organization or outsource these functions to third parties. Our current plan for our oncology products, other than MM-121, for which we receive marketing approval, is to market and sell these products ourselves in the United States and Europe and to establish distribution or other marketing arrangements with third parties for these products in the rest of the world. We have an option to co-promote MM-121 in the United States with Sanofi, which otherwise holds worldwide commercialization rights to this product candidate.

There are risks involved with both establishing our own sales and marketing capabilities and entering into arrangements with third parties to perform these services. For example, recruiting and training a sales force is expensive and time-consuming and could delay any product launch. If the commercial launch of a product candidate for which we recruit a sales force and establish marketing capabilities is delayed or does not occur for any reason, we would have prematurely or unnecessarily incurred these commercialization expenses. This may be costly, and our investment would be lost if we cannot retain or reposition our sales and marketing personnel.

Establishing effective sales, marketing and distribution capabilities and infrastructure in Europe may be particularly difficult for us. We have no prior experience in these areas. In addition, there are complex regulatory, tax, labor and other legal requirements imposed by both the European Union and many of the individual countries in Europe with which we will need to comply. Many U.S.-based biopharmaceutical companies have found the process of marketing their own products in Europe to be very challenging.

We also may not be successful entering into arrangements with third parties to sell and market our product candidates or doing so on terms that are favorable to us. We likely will have little control over such third parties, and any of them may fail to devote the necessary resources and attention to sell and market our products effectively. If we do not establish sales and marketing capabilities successfully, either on our own or in collaboration with third parties, we will not be successful in commercializing our product candidates.

Table of Contents

We face substantial competition, which may result in others discovering, developing or commercializing products before or more successfully than we do.

The development and commercialization of new therapeutic and diagnostic products is highly competitive. We face competition with respect to our current product candidates, and will face competition with respect to any products that we may seek to develop or commercialize in the future, from major pharmaceutical companies, specialty pharmaceutical companies and biotechnology companies worldwide. Several large pharmaceutical and biotechnology companies currently market and sell products for the treatment of the solid tumor indications for which we are developing our product candidates. Potential competitors also include academic institutions, government agencies and other public and private research organizations that conduct research, seek patent protection and establish collaborative arrangements for research, development, manufacturing and commercialization. Many of these competitors are attempting to develop therapeutics for our target indications.

We are developing our product candidates for the treatment of solid tumors. There are a variety of available therapies marketed for solid tumors. In many cases, these drugs are administered in combination to enhance efficacy. Some of these drugs are branded and subject to patent protection, and others are available on a generic basis, including the active ingredients in MM-398 and MM-302. Many of these approved drugs are well established therapies and are widely accepted by physicians, patients and third-party payors. This may make it difficult for us to achieve our business strategy of replacing existing therapies with our product candidates.

There are also a number of products in late stage clinical development to treat solid tumors. Our competitors may develop products that are more effective, safer, more convenient or less costly than any that we are developing or that would render our product candidates obsolete or non-competitive. Our competitors may also obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours.

Many of our competitors have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials, obtaining regulatory approvals and marketing approved products than we do. Mergers and acquisitions in the pharmaceutical, biotechnology and diagnostic industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These third parties compete with us in recruiting and retaining qualified scientific and management personnel, establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs.

Even if we are able to commercialize any product candidates, the products may become subject to unfavorable pricing regulations, third-party reimbursement practices or healthcare reform initiatives, which could harm our business.

The regulations that govern marketing approvals, pricing and reimbursement for new therapeutic and diagnostic products vary widely from country to country. Some countries require approval of the sale price of a product before it can be marketed. In many countries, the pricing review period begins after marketing or product licensing approval is granted. In some foreign markets, prescription pharmaceutical pricing remains subject to continuing governmental control even after initial approval is granted. As a result, we might obtain regulatory approval for a product in a particular country, but then be subject to price regulations that delay our commercial launch of the product and negatively impact the revenues we are able to generate from the sale of the product in that country. Adverse pricing limitations may hinder our ability to recoup our investment in one or more product candidates, even if our product candidates obtain regulatory approval.

Our ability to commercialize any products successfully also will depend in part on the extent to which reimbursement for these products and related treatments will be available from government health administration authorities, private health insurers and other organizations. Government authorities and third-party payors, such

Table of Contents

as private health insurers and health maintenance organizations, decide which medications they will pay for and establish reimbursement levels. A primary trend in the U.S. healthcare industry and elsewhere is cost containment. Government authorities and these third-party payors have attempted to control costs by limiting coverage and the amount of reimbursement for particular medications. Increasingly, third-party payors are requiring that companies provide them with predetermined discounts from list prices and are challenging the prices charged for medical products. We cannot be sure that reimbursement will be available for any product that we commercialize and, if reimbursement is available, what the level of reimbursement will be. Reimbursement may impact the demand for, or the price of, any product for which we obtain marketing approval. Obtaining reimbursement for our products may be particularly difficult because of the higher prices often associated with products administered under the supervision of a physician. If reimbursement is not available or is available only to limited levels, we may not be able to successfully commercialize any product candidate that we successfully develop.

There may be significant delays in obtaining reimbursement for approved products, and coverage may be more limited than the purposes for which the product is approved by the FDA or regulatory authorities in other countries. Moreover, eligibility for reimbursement does not imply that any product will be paid for in all cases or at a rate that covers our costs, including research, development, manufacture, sale and distribution. Interim payments for new products, if applicable, may also not be sufficient to cover our costs and may not be made permanent. Payment rates may vary according to the use of the product and the clinical setting in which it is used, may be based on payments allowed for lower cost products that are already reimbursed, and may be incorporated into existing payments for other services. Net prices for products may be reduced by mandatory discounts or rebates required by government healthcare programs or private payors and by any future weakening of laws that presently restrict imports of products from countries where they may be sold at lower prices than in the United States. Third-party payors often rely upon Medicare coverage policy and payment limitations in setting their own reimbursement policies. Our inability to promptly obtain coverage and profitable payment rates from both government-funded and private payors for new products that we develop could have a material adverse effect on our operating results, our ability to raise capital needed to commercialize products and our overall financial condition.

Product liability lawsuits against us could cause us to incur substantial liabilities and to limit commercialization of any products that we may develop.

We face an inherent risk of product liability exposure related to the testing of our product candidates in human clinical trials and will face an even greater risk if we commercially sell any products that we may develop. If we cannot successfully defend ourselves against claims that our product candidates or products caused injuries, we will incur substantial liabilities. Regardless of merit or eventual outcome, liability claims may result in:

decreased demand for any product candidates or products that we may develop;

injury to our reputation and significant negative media attention;

withdrawal of patients from clinical trials;

significant costs to defend the related litigation;

substantial monetary awards to patients;

loss of revenue; and

the inability to commercialize any products that we may develop.

We currently hold \$10.0 million in product liability insurance coverage, which may not be adequate to cover all liabilities that we may incur. Insurance coverage is increasingly expensive. We may not be able to maintain insurance coverage at a reasonable cost or in an amount adequate to satisfy any or every liability that may arise.

Table of Contents

We may expend our limited resources to pursue a particular product candidate or indication and fail to capitalize on product candidates or indications that may be more profitable or for which there is a greater likelihood of success.

Because we have limited financial and managerial resources, we focus on research programs and product candidates for specific indications. As a result, we may forego or delay pursuit of opportunities with other product candidates or other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs and product candidates for specific indications may not yield any commercially viable products.

We have based our research and development efforts on our Network Biology approach. Notwithstanding our large investment to date and anticipated future expenditures in Network Biology, we have not yet developed, and may never successfully develop, any marketed products using this approach. As a result of pursuing our Network Biology approach, we may fail to address or develop product candidates or indications based on other scientific approaches that may offer greater commercial potential or for which there is a greater likelihood of success.

We also may not be successful in our efforts to identify or discover additional product candidates through our Network Biology approach. Research programs to identify new product candidates require substantial technical, financial and human resources. These research programs may initially show promise in identifying potential product candidates, yet fail to yield product candidates for clinical development.

If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through collaboration, licensing or other royalty arrangements in cases in which it would have otherwise been more advantageous for us to retain sole development and commercialization rights.

We plan to establish separately funded companies for the development of product candidates using our Network Biology approach in some areas outside the oncology field. These companies may not be successful in the development and commercialization of any product candidates.

We plan to apply our Network Biology approach to multiple additional disease areas outside the oncology field. We expect to do so in some cases through the establishment of separately funded companies. For example, we established Silver Creek to develop product candidates in the field of regenerative medicine using Network Biology. Silver Creek has received separate funding from investors other than us. Although Silver Creek is currently majority owned by us, in the future we may not be the majority owner of or control Silver Creek or other companies that we establish. If in the future we do not control Silver Creek or any future similar company that we establish, Silver Creek or such other companies could take actions that we do not endorse or with which we disagree, such as using Network Biology in a way that reflects adversely on us. In addition, these companies may have difficulty raising additional funds and could encounter any of the risks in developing and commercializing product candidates to which we are subject.

If we fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could have a material adverse effect on the success of our business.

We are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. Our operations involve the use of hazardous and flammable materials, including chemicals and radioactive and biological materials. Our operations also produce hazardous waste products. We generally contract with third parties for the

disposal of these materials and wastes. We also store certain low level radioactive waste at our facilities until the materials can be properly disposed of. We cannot eliminate the risk of

Table of Contents

contamination or injury from these materials. In the event of contamination or injury resulting from our use of hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. We also could incur significant costs associated with civil or criminal fines and penalties.

Although we maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees resulting from the use of hazardous materials, this insurance may not provide adequate coverage against potential liabilities. We do not maintain insurance for environmental liability or toxic tort claims that may be asserted against us in connection with our storage, use or disposal of biological, hazardous or radioactive materials.

In addition, we may be required to incur substantial costs to comply with current or future environmental, health and safety laws and regulations. These current or future laws and regulations may impair our research, development or production efforts. Failure to comply with these laws and regulations also may result in substantial fines, penalties or other sanctions.

Fluctuations in foreign currency exchange rates could substantially increase the costs of our clinical trial programs.

A significant portion of our clinical trial activities are conducted outside of the United States, and associated costs may be incurred in the local currency of the country in which the trial is being conducted, which costs could be subject to fluctuations in foreign exchange rates. At present, we do not engage in hedging transactions to protect against uncertainty in future exchange rates between particular foreign currencies and the U.S. dollar. A decline in the value of the U.S. dollar against currencies in geographies in which we conduct clinical trials could have a negative impact on our research and development costs. We cannot predict the impact of foreign currency fluctuations, and foreign currency fluctuations in the future may adversely affect our development costs.

Risks Related to Our Dependence on Third Parties

The successful development and commercialization of MM-121 depends substantially on our collaboration with Sanofi. If Sanofi is unable or unwilling to further develop or commercialize MM-121, or experiences significant delays in doing so, our business will be materially harmed.

MM-121 is one of our most clinically advanced product candidates. In 2009, we entered into a license and collaboration agreement with Sanofi for the development and commercialization of MM-121. Prior to this collaboration, we did not have a history of working together with Sanofi. The collaboration involves a complex allocation of rights, provides for milestone payments to us based on the achievement of specified development, regulatory and commercial sale milestones, and provides us with royalty-based revenue if MM-121 is successfully commercialized. We cannot predict the success of the collaboration.

Under our license and collaboration agreement, Sanofi has significant control over the conduct and timing of development and commercialization efforts with respect to MM-121. Although we and Sanofi have approved a global development plan, Sanofi may change its development plans for MM-121 at any time. We have little control over the amount, timing and quality of resources that Sanofi devotes to the development or commercialization of MM-121. If Sanofi fails to devote sufficient financial and other resources to the development or commercialization of MM-121, the development and commercialization of MM-121 would be delayed or could fail. This would result in a delay in our receiving milestone payments or royalties with respect to MM-121 or in our not receiving such milestone payments or royalties at all.

If we lose Sanofi as a collaborator in the development or commercialization of MM-121, it would materially harm our business.

Sanofi has the right to terminate our agreement for the development and commercialization of MM-121, in whole or with respect to specified territories, at any time and for any reason, upon 180 days prior written notice. Sanofi also has the right to terminate our agreement if we fail to cure a material breach of our agreement within a specified cure period, or fail to diligently pursue a cure if such a breach is not curable within such period.

Table of Contents

If Sanofi terminates our agreement at any time, whether on the basis of our uncured material breach or for any other reason, it would delay or prevent our development of MM-121 and materially harm our business and could accelerate our need for additional capital. In particular, we would have to fund the clinical development and commercialization of MM-121 on our own, seek another collaborator or licensee for such clinical development and commercialization, or abandon the development and commercialization of MM-121.

The successful development and commercialization of MM-398 currently depend on our collaboration with PharmaEngine. If PharmaEngine does not provide clinical trial data to us, our business may be materially harmed.

We have a collaboration with PharmaEngine for the development of MM-398. Under this collaboration, PharmaEngine has rights to commercialize MM-398 in Taiwan, while we hold commercialization rights in all other countries, including the United States. PharmaEngine also has the opportunity to participate in the development of MM-398, for which we are reimbursing their costs. We cannot predict the success of the collaboration. The collaboration involves an allocation of rights, provides for milestone payments by us to PharmaEngine based on the achievement of specified milestones and provides for us to pay PharmaEngine royalties on sales of MM-398 in Europe and specified Asian countries if MM-398 is successfully commercialized in Europe and such specified Asian countries.

We rely on PharmaEngine to provide data and information to us from trials they have conducted and are currently conducting. This information is necessary for our development of MM-398 in the United States. If PharmaEngine does not provide this information to us, our development of MM-398 could be significantly delayed and our costs could increase significantly.

We may depend on collaborations with third parties for the development and commercialization of our product candidates. If those collaborations are not successful, we may not be able to capitalize on the market potential of these product candidates.

Our business plan is to enter into distribution and other marketing arrangements for our oncology products in areas of the world outside of the United States and Europe. In addition, depending on our capital requirements, development and commercialization costs, need for additional therapeutic expertise and other factors, it is possible that we will enter into broader development and commercialization arrangements with respect to either oncology product candidates in addition to MM-121 or product candidates in other therapeutic areas in the United States or Europe or other territories. In particular, while we expect to apply our Network Biology approach to other disease areas through arrangements similar to Silver Creek, it is also possible that we will seek to enter into licensing agreements or other types of collaborations for the application of our Network Biology approach.

Our likely collaborators for any distribution, marketing, licensing or broader collaboration arrangements include large and mid-size pharmaceutical companies, regional and national pharmaceutical companies and biotechnology companies. We are also a party to a right of review agreement with Sanofi pursuant to which, if we determine to enter into negotiations with a third party regarding any license, option, collaboration, joint venture or similar transaction involving any therapeutic or companion diagnostic product candidate in our pipeline, we will notify Sanofi of such opportunity. Following such notice, Sanofi will have a specified period of time to review the opportunity and determine whether to exercise an additional right to exclusively negotiate an agreement with us with respect to such opportunity for a specified period of time. In addition, in specified circumstances, if we subsequently propose to enter into any third-party agreement, we must first offer the same terms and conditions to Sanofi. Our right of review agreement with Sanofi could discourage other companies from engaging with us in discussions or negotiations regarding collaboration agreements.

We will have limited control over the amount and timing of resources that our collaborators dedicate to the development or commercialization of our product candidates. Our ability to generate revenues from these arrangements will depend on our collaborators' abilities to successfully perform the functions assigned to them in these arrangements.

Table of Contents

Collaborations involving our product candidates, including our collaboration with Sanofi, pose the following risks to us:

collaborators have significant discretion in determining the efforts and resources that they will apply to these collaborations;

collaborators may not pursue development and commercialization of our product candidates or may elect not to continue or renew development or commercialization programs based on clinical trial results, changes in their strategic focus or available funding, or external factors such as an acquisition that diverts resources or creates competing priorities;

collaborators may delay clinical trials, provide insufficient funding for a clinical trial program, stop a clinical trial or abandon a product candidate, repeat or conduct new clinical trials or require a new formulation of a product candidate for clinical testing;

collaborators could independently develop, or develop with third parties, products that compete directly or indirectly with our products or product candidates if the collaborators believe that competitive products are more likely to be successfully developed or can be commercialized under terms that are more economically attractive;

a collaborator with marketing and distribution rights to one or more products may not commit sufficient resources to their marketing and distribution;

collaborators may not properly maintain or defend our intellectual property rights or may use our proprietary information in such a way as to invite litigation that could jeopardize or invalidate our proprietary information or expose us to potential litigation;

disputes may arise between us and the collaborators that result in the delay or termination of the research, development or commercialization of our product candidates or that result in costly litigation or arbitration that diverts management attention and resources; and

collaborations may be terminated and, if terminated, may result in a need for additional capital to pursue further development or commercialization of the applicable product candidates.

Collaboration agreements may not lead to development or commercialization of product candidates in the most efficient manner or at all. In addition, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced number of potential future collaborators. If a present or future collaborator of ours were to be involved in a business combination, the continued pursuit and emphasis on our product development or commercialization program could be delayed, diminished or terminated.

If we are not able to establish additional collaborations, we may have to alter our development plans.

Our product development programs and the potential commercialization of our product candidates will require substantial additional cash to fund expenses. For some of our product candidates, we may decide to collaborate with pharmaceutical and biotechnology companies for the development and potential commercialization of those product candidates.

We face significant competition in seeking appropriate collaborators. Collaborations are complex and time-consuming to negotiate and document. We may also be restricted under existing collaboration agreements from entering into agreements on certain terms with other potential collaborators. We may not be able to negotiate collaborations on acceptable terms, or at all. If that were to occur, we may have to curtail the development of a particular product candidate, reduce or delay its development program or one or more of our other development programs, delay its potential commercialization or reduce the scope of our sales or marketing activities, or increase our expenditures and undertake development or commercialization activities at our own expense. If we elect to increase our expenditures to fund development or commercialization activities on our own, we may need to obtain additional capital, which may not be available to us on acceptable terms or at all. If we do not have sufficient funds, we will not be able to bring our product candidates to market and generate product revenue.

Table of Contents

We rely on third parties to conduct our clinical trials, and those third parties may not perform satisfactorily, including failing to meet deadlines for the completion of such trials.

We do not independently conduct clinical trials of our product candidates. We rely on third parties, such as contract research organizations, clinical data management organizations, medical institutions and clinical investigators, to perform this function. Our reliance on these third parties for clinical development activities reduces our control over these activities but does not relieve us of our responsibilities. We remain responsible for ensuring that each of our clinical trials is conducted in accordance with the general investigational plan and protocols for the trial. Moreover, the FDA and other international regulatory agencies require us to comply with standards, commonly referred to as good clinical practices, for conducting, recording and reporting the results of clinical trials to assure that adverse event data are reported within required timeframes, that data and reported results are credible and accurate and that the rights, integrity and confidentiality of patients in clinical trials are protected. Furthermore, these third parties may also have relationships with other entities, some of which may be our competitors. If these third parties do not successfully carry out their contractual duties, meet expected deadlines or conduct our clinical trials in accordance with regulatory requirements or our stated protocols, we will not be able to obtain, or may be delayed in obtaining, regulatory approvals for our product candidates and will not be able to, or may be delayed in our efforts to, successfully commercialize our product candidates.

We also rely on other third parties to store and distribute supplies for our clinical trials. Any performance failure on the part of our existing or future distributors could delay clinical development or regulatory approval of our product candidates or commercialization of our products or cause us to incur additional costs, producing additional losses and depriving us of potential product revenue.

Risks Related to the Manufacturing of Our Product Candidates

We have limited experience in manufacturing our product candidates. We will need to upgrade and expand our manufacturing facility and augment our manufacturing personnel and processes in order to meet our business plans. If we fail to do so, we may not have sufficient drug product to meet our clinical development and commercial requirements.

We have a manufacturing facility located at our corporate headquarters in Cambridge, Massachusetts. We manufacture drug substance at this facility that we use for research and development purposes and for clinical trials of our product candidates. We do not have experience in manufacturing products at a commercial scale. Our current facility may not be sufficient to permit manufacturing of our product candidates for Phase 3 clinical trials or commercial sale. In order to meet our business plan, which contemplates our internally manufacturing drug substance for most of our clinical trials and, over the long-term, for a significant portion of our commercial requirements, we will need to upgrade and expand our manufacturing facilities, add manufacturing personnel and ensure that validated processes are consistently implemented in our facilities. The upgrade and expansion of our facilities will require additional regulatory approvals. In addition, it will be costly and time-consuming to expand our facilities and recruit necessary additional personnel. If we are unable to expand our manufacturing facilities in compliance with regulatory requirements or to hire additional necessary manufacturing personnel, we may encounter delays or additional costs in achieving our research, development and commercialization objectives, including in obtaining regulatory approvals of our product candidates, which could materially damage our business and financial position.

If our manufacturing facility is damaged or destroyed or production at this facility is otherwise interrupted, our business and prospects would be negatively affected.

If the manufacturing facility at our corporate headquarters or the equipment in it is damaged or destroyed, we may not be able to quickly or economically replace our manufacturing capacity or replace it at all. In the event of a temporary or protracted loss of this facility or equipment, we might not be able to transfer manufacturing to a third party. Even if we could transfer manufacturing to a third party, the shift would likely be expensive and time-consuming, particularly since the new facility would need to comply with the necessary

Table of Contents

regulatory requirements and we would need FDA approval before selling any products manufactured at that facility. Such an event could delay our clinical trials or, if our product candidates are approved by the FDA, reduce our product sales.

Currently, we maintain insurance coverage against damage to our property and equipment and to cover business interruption and research and development restoration expenses. If we have underestimated our insurance needs with respect to an interruption in our clinical manufacturing of our product candidates, we may not be able to cover our losses.

Any other interruption of production at our manufacturing facility also could damage our business. For example, in 2009, we experienced a viral contamination at this facility that required that we shut the facility entirely for decontamination. Because of this contamination, the FDA placed a partial clinical hold on our IND for MM-121 until we submitted supporting documentation to the FDA regarding our decontamination procedures. Although we were able to resolve this issue, with the FDA lifting the partial clinical hold in April 2010, other companies have experienced similar contamination problems, and we could experience a similar problem in the future that is more difficult to resolve and could lead to a clinical hold.

We expect to continue to contract with third parties for at least some aspects of the production of our product candidates for clinical trials and for our products if they are approved for marketing. This increases the risk that we will not have sufficient quantities of our product candidates or products or such quantities at an acceptable cost, which could delay, prevent or impair our development or commercialization efforts.

We currently rely on third-party manufacturers for some aspects of the production of our product candidates for preclinical testing and clinical trials, including fill-finish and labeling activities. In addition, while we believe that our existing manufacturing facility, or additional facilities that we will be able to build, will be sufficient to meet our requirements for manufacturing a significant portion of drug substance for our research and development activities, we may need to rely on third-party manufacturers for some of these requirements, particularly later stage clinical trials of our antibody product candidates, and, at least in the near term, for commercial supply of any product candidates for which we obtain marketing approval.

We do not have any agreements with third-party manufacturers for the clinical or commercial supply of any of our product candidates, and we may be unable to conclude such agreements or to do so on acceptable terms. Reliance on third-party manufacturers entails additional risks, including:

reliance on the third party for regulatory compliance and quality assurance;

the possible breach of the manufacturing agreement by the third party; and

the possible termination or nonrenewal of the agreement by the third party at a time that is costly or inconvenient for us.

Third-party manufacturers may not be able to comply with cGMP, QSR or similar regulatory requirements outside the United States. Our failure, or the failure of our third-party manufacturers, to comply with applicable regulations could result in sanctions being imposed on us, including fines, injunctions, civil penalties, delays, suspension or withdrawal of approvals, license revocation, seizures or recalls of products, operating restrictions and criminal prosecutions, any

of which could significantly and adversely affect supplies of our products.

Any products that we may develop may compete with other product candidates and products for access to manufacturing facilities. Because there are a limited number of manufacturers that operate under cGMP or QSR regulations and that might be capable of manufacturing for us, we may not have access to such manufacturers.

We currently rely on single suppliers for the resins, media and filters that we use for our manufacturing process. We purchase these materials from our suppliers on a purchase order basis and do not have long-term supply agreements in place. Any performance failure or refusal to supply on the part of our existing or future

Table of Contents

suppliers could delay clinical development, marketing approval or commercialization of our products. If our current suppliers cannot perform as agreed, we may be required to replace one or more of these suppliers. Although we believe that there may be a number of potential long-term replacements to each supplier, we may incur added costs and delays in identifying and qualifying any such replacements.

We likely will rely upon third-party manufacturers to provide us with necessary reagents and instruments to develop, test and manufacture our *in vitro* companion diagnostics. Currently, many reagents are marketed as Research Use Only, or RUO, products under FDA regulations. In June 2011, the FDA issued a draft guidance that outlined the FDA's intention to impose additional restrictions on the provision of RUO products. If this guidance is finalized as drafted, we may experience difficulty securing the reagents that we need.

Our potential future dependence upon others for the manufacture of our product candidates may adversely affect our future profit margins and our ability to commercialize any products that receive regulatory approval on a timely and competitive basis.

We rely on third parties to perform various tasks related to the manufacturing of our product candidates. Compliance by such third parties with regulations of the FDA or other regulatory bodies cannot be assured, which could adversely impact our clinical trials.

A former fill-finish third-party contractor that we used to fill and package both MM-121 and MM-111 experienced FDA inspection issues with its quality control processes that resulted in a formal warning letter from the FDA. Following a review by Sanofi and us, some MM-121 was pulled from clinical trial sites and replaced with MM-121 that was filled by a different contractor. This restocking resulted in a few patients missing one or two doses of MM-121.

The MM-111 that was being used in our clinical trials was also filled and packaged by this same contractor. The FDA inquired about the effect of this contractor's quality issues on MM-111 clinical trial materials. Following our response to the FDA's inquiry, the FDA requested in January 2012 that we obtain new consents from any patients enrolled in our ongoing Phase 1 clinical trials of MM-111 in connection with continued use in these trials of MM-111 material filled and packaged by this contractor. In addition, the FDA placed a partial clinical hold on these ongoing clinical trials, which restricted our ability to enroll new patients in these trials, until MM-111 material filled and packaged by a new third-party contractor that we engaged was available. This restocking is complete and resulted in a short delay in the dosing of a few patients without any patients missing a dose.

Although we have addressed the concerns of the FDA with respect to the clinical trial material filled and packaged by our former third-party contractor, it is possible that we could experience similar issues with other contractors.

Risks Related to Our Intellectual Property

If we fail to fulfill our obligations under our intellectual property licenses with third parties, we could lose license rights that are important to our business.

We are a party to a number of intellectual property license agreements with third parties, including with respect to MM-121, MM-111, MM-302, MM-151 and MM-141, and expect to enter into additional license agreements in the future. Our existing license agreements impose, and we expect that our future license agreements will impose, various diligence, milestone payment, royalty, insurance and other obligations on us. If we fail to comply with these obligations, our licensors may have the right to terminate these agreements, in which event we might not be able to develop and market any product that is covered by these agreements. Termination of these licenses or reduction or

elimination of our licensed rights may result in our having to negotiate new or reinstated licenses with less favorable terms. The occurrence of such events could materially harm our business.

Table of Contents

If we are unable to obtain and maintain patent protection for our technology and products, or if our licensors are unable to obtain and maintain patent protection for the technology or products that we license from them, our competitors could develop and commercialize technology and products similar or identical to ours, and our ability to successfully commercialize our technology and products may be adversely affected.

Our success depends in large part on our and our licensors' ability to obtain and maintain patent protection in the United States and other countries with respect to our proprietary technology and products. In some circumstances, we may not have the right to control the preparation, filing and prosecution of patent applications, or to maintain the patents, covering technology or products that we license from third parties. Therefore, we cannot be certain that these patents and applications will be prosecuted and enforced in a manner consistent with the best interests of our business. In addition, if third parties who license patents to us fail to maintain such patents, or lose rights to those patents, the rights we have licensed may be reduced or eliminated.

We have sought to protect our proprietary position by filing patent applications in the United States and abroad related to our novel technologies and products that are important to our business. This process is expensive and time-consuming, and we may not be able to file and prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner. It is also possible that we will fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection. Under our license and collaboration agreement with Sanofi, we are obligated, at our expense, to use commercially reasonable efforts to file and prosecute patent applications, and maintain patents, covering MM-121 in specified jurisdictions, and these patent rights are licensed to Sanofi.

The patent position of biotechnology and pharmaceutical companies generally is highly uncertain, involves complex legal and factual questions and has in recent years been the subject of much litigation. As a result, the issuance, scope, validity, enforceability and commercial value of our and our licensors' patent rights are highly uncertain. Our and our licensors' pending and future patent applications may not result in patents being issued which protect our technology or products or which effectively prevent others from commercializing competitive technologies and products. Changes in either the patent laws or interpretation of the patent laws in the United States and other countries may diminish the value of our patents or narrow the scope of our patent protection. The laws of foreign countries may not protect our rights to the same extent as the laws of the United States. Publications of discoveries in the scientific literature often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are typically not published until 18 months after filing, or in some cases not at all. Therefore, we cannot be certain that we or our licensors were the first to make the inventions claimed in our owned and licensed patents or pending patent applications, or that we or our licensors were the first to file for patent protection of such inventions. Assuming the other requirements for patentability are met, the first to file a patent application is entitled to the patent. Under the America Invents Act enacted in 2011, the United States moved to this first to file system in early 2013 from the previous system under which the first to make the claimed invention was entitled to the patent. We may become involved in opposition, interference or derivation proceedings challenging our patent rights or the patent rights of others. An adverse determination in any such proceeding could reduce the scope of, or invalidate, our patent rights, allow third parties to commercialize our technology or products and compete directly with us, without payment to us, or result in our inability to manufacture or commercialize products without infringing third-party patent rights.

Even if our owned and licensed patent applications issue as patents, they may not issue in a form that will provide us with any meaningful protection, prevent competitors from competing with us or otherwise provide us with any competitive advantage. Our competitors may be able to circumvent our owned or licensed patents by developing similar or alternative technologies or products in a non-infringing manner. The issuance of a patent is not conclusive as to its scope, validity or enforceability, and our owned and licensed patents may be challenged in the courts or patent offices in the United States and abroad. Such challenges may result in patent claims being narrowed, invalidated or

held unenforceable, which could limit our ability to stop or prevent us from stopping others from using or commercializing similar or identical technology and products, or limit the duration of the patent protection of our technology and products. Given the amount of time required for the development, testing

Table of Contents

and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. As a result, our owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing products similar or identical to ours.

We may become involved in lawsuits to protect or enforce our patents, which could be expensive, time-consuming and unsuccessful.

Competitors may infringe our patents. To counter infringement or unauthorized use, we may be required to initiate infringement lawsuits, which can be expensive and time-consuming. In addition, in an infringement proceeding, a court may decide that a patent of ours is invalid or unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation proceeding could put one or more of our patents at risk of being invalidated or interpreted narrowly. Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation.

Third parties may initiate legal proceedings alleging that we are infringing their intellectual property rights, the outcome of which would be uncertain and could have a material adverse effect on the success of our business.

Our commercial success depends upon our ability and the ability of our collaborators to develop, manufacture, market and sell our product candidates and use our proprietary technologies without infringing the enforceable proprietary rights of third parties. We may become party to, or threatened with, future adversarial proceedings or litigation regarding intellectual property rights with respect to our products and technology, including interference or derivation proceedings before the U.S. Patent and Trademark Office. Third parties may assert infringement claims against us based on existing patents or patents that may be granted in the future. If we are found to infringe a third party's intellectual property rights, we could be required to obtain a license from such third party to continue developing and marketing our products and technology. However, we may not be able to obtain any required license on commercially reasonable terms or at all. Even if we were able to obtain a license, it could be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. We could be forced, including by court order, to cease commercializing the infringing technology or product. In addition, we could be found liable for monetary damages. A finding of infringement could prevent us from commercializing our product candidates or force us to cease some of our business operations, which could materially harm our business. Claims that we have misappropriated the confidential information or trade secrets of third parties can have a similar negative impact on our business.

For example, we are aware of issued U.S. patents held by Genentech broadly covering methods of producing certain types of recombinant antibodies and related compositions for antibody production that may be relevant to our development and commercialization of MM-121, MM-151 and MM-141. These patents expire in 2018. Genentech has asserted infringement claims against several pharmaceutical and biotechnology companies based on these patents. If these patents were determined to be valid and cover our product candidates, we would need to obtain a license to the patented technology, which may cause us to incur licensing related costs. However, a license to these patents may not be available on commercially reasonable terms, or at all. Our failure to obtain a license to these patents could delay or prevent our development and commercialization of our product candidates in the United States.

We may be subject to claims that our employees have wrongfully used or disclosed alleged trade secrets of their former employers.

Many of our employees were previously employed at universities or other biotechnology or pharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees do not

use the proprietary information or know-how of others in their work for us, we may be subject to claims that we or these employees have used or disclosed intellectual property, including trade secrets or other proprietary

Table of Contents

information, of any such employee's former employer. Litigation may be necessary to defend against these claims. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management.

We are currently engaged in two ongoing opposition proceedings to European patents in the European Patent Office. If we are not successful in these proceedings, we may not be able to commercialize some of our product candidates without infringing patents held by third parties.

We are currently engaged in two ongoing opposition proceedings to European patents in the European Patent Office to narrow or invalidate the claims of patents owned by third parties. For more information, see Part I, Item 3. Legal Proceedings in this Annual Report on Form 10-K. We have obtained favorable interim decisions in both oppositions, although both decisions are now under appeal. The ultimate outcome of these oppositions remains uncertain. If we are not ultimately successful in these proceedings, and the issued claims of the patents we are opposing were determined to be valid and construed to cover MM-121, MM-111 or MM-141, we may not be able to commercialize MM-121, MM-111 or MM-141 in some or all European countries without infringing such patents. If we infringe a valid claim of these patents, we would need to obtain a license to the patented technology, which may cause us to incur licensing-related costs. For example, under our license and collaboration agreement with Sanofi, we are obligated to pay all licensing costs for specified third-party patent rights that we or Sanofi may in the future license for the development and commercialization of MM-121, including the patent rights that are the subject of one of these opposition proceedings. However, a license to the patents that are the subject of these opposition proceedings may not be available on commercially reasonable terms or at all. As a result, we could be liable for monetary damages or we may be forced to delay, suspend, forego or cease commercializing these product candidates in some or all countries in Europe if we were found to infringe a valid claim of these patents. In addition, even if we are ultimately successful in these European opposition proceedings, such results would be limited to our activities in Europe.

We are also aware of issued or pending counterparts to one of these European patents in the United States that may be relevant to our development and commercialization of MM-121. If these patents were determined to be valid and construed to cover MM-121, our development and commercialization of MM-121 in the United States could be delayed or prevented.

Intellectual property litigation could cause us to spend substantial resources and distract our personnel from their normal responsibilities.

Even if resolved in our favor, litigation or other legal proceedings relating to intellectual property claims may cause us to incur significant expenses, and could distract our technical and management personnel from their normal responsibilities. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments and if securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock. Such litigation or proceedings could substantially increase our operating losses and reduce our resources available for development activities. We may not have sufficient financial or other resources to adequately conduct such litigation or proceedings. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their substantially greater financial resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could have a material adverse effect on our ability to compete in the marketplace.

If we are unable to protect the confidentiality of our trade secrets, our business and competitive position would be harmed.

In addition to our patented technology and products, we rely on trade secrets, including unpatented know-how, technology and other proprietary information, to maintain our competitive position. We seek to protect these trade secrets, in part, by entering into non-disclosure and confidentiality agreements with parties that have

Table of Contents

access to them, such as our employees, corporate collaborators, outside scientific collaborators, sponsored researchers, contract manufacturers, consultants, advisors and other third parties. We also enter into confidentiality and invention or patent assignment agreements with our employees and consultants. In addition, any of these parties may breach the agreements and disclose our proprietary information, and we may not be able to obtain adequate remedies for such breaches. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret is difficult, expensive and time-consuming, and the outcome is unpredictable. In addition, some courts inside and outside the United States are less willing or unwilling to protect trade secrets. If any of our trade secrets were to be lawfully obtained or independently developed by a competitor, we would have no right to prevent them from using that technology or information to compete with us. If any of our trade secrets were to be disclosed to or independently developed by a competitor, our competitive position would be harmed.

Risks Related to Regulatory Approval of Our Product Candidates

If we are not able to obtain required regulatory approvals, we will not be able to commercialize our product candidates, and our ability to generate revenue will be materially impaired.

Our product candidates, including our six most advanced product candidates, and the activities associated with their development and commercialization, including their design, testing, manufacture, safety, efficacy, recordkeeping, labeling, storage, approval, advertising, promotion, sale and distribution, import, export, sampling and marketing are subject to comprehensive regulation by the FDA and other regulatory agencies in the United States and by comparable authorities in other countries. Failure to obtain regulatory approval for a product candidate will prevent us from commercializing the product candidate. We have not received regulatory approval to market any of our product candidates in any jurisdiction. We have only limited experience in filing and supporting the applications necessary to gain regulatory approvals and expect to rely on third-party contract research organizations to assist us in this process. Securing regulatory approval requires the submission of extensive preclinical and clinical data and supporting information to the FDA and other regulatory agencies for each therapeutic indication to establish the product candidate's safety and efficacy. Securing regulatory approval also requires the submission of information about the product manufacturing process to, and inspection of manufacturing facilities by, the FDA or other regulatory agencies. Our product candidates may not be effective, may be only moderately effective or may prove to have undesirable or unintended side effects, toxicities or other characteristics that may preclude our obtaining regulatory approval or prevent or limit commercial use.

The process of obtaining regulatory approvals is expensive, may take many years if additional clinical trials are required, if approval is obtained at all, and can vary substantially based on a variety of factors, including the type, complexity and novelty of the product candidates involved. Changes in regulatory approval policies during the development period, changes in or the enactment of additional statutes or regulations, changes in regulatory review for each submitted product application or approval of other products for the same indication may cause delays in the approval or rejection of an application. Regulatory agencies have substantial discretion in the approval process and may refuse to accept any application or may decide that our data is insufficient for approval and require additional preclinical, clinical or other studies. In addition, varying interpretations of the data obtained from preclinical and clinical testing could delay, limit or prevent regulatory approval of a product candidate. Any regulatory approval we ultimately obtain may be limited or subject to restrictions or post-approval commitments that render the approved product not commercially viable.

If we pursue development of a companion diagnostic to identify patients who are likely to benefit from a therapeutic product, failure to obtain approval for the diagnostic may prevent or delay approval of the therapeutic product.

We are attempting to develop companion diagnostics to identify patients who are likely to benefit from our therapeutic product candidates. All of our companion diagnostic candidates are in preclinical development or clinical feasibility testing. We have very limited experience in the development of diagnostics and, even with the help of third parties with greater experience, may fail to obtain the required diagnostic product marketing approval, which could prevent or delay approval of the therapeutic product.

Table of Contents

In July 2011, the FDA issued draft guidance that stated that if safe and effective use of a therapeutic depends on an *in vitro* diagnostic, then the FDA generally will not approve the therapeutic unless the FDA approves or clears this *in vitro* companion diagnostic device at the same time that the FDA approves the therapeutic. The approval or clearance of the *in vitro* diagnostic most likely will occur through the FDA's Center for Devices and Radiological Health Office of In Vitro Diagnostics and Radiological Health. It is unclear whether the FDA will finalize this guidance in its current format. Even if the FDA does finalize the guidance in its current format, it is unclear how it will interpret the guidance. Even with the issuance of the draft guidance, the FDA's expectations for *in vitro* companion diagnostics remain unclear in some respects. The FDA's developing expectations will affect our *in vitro* companion diagnostics. In particular, the FDA may limit our ability to use retrospective data, otherwise disagree with our approaches to trial design, biomarker qualification, clinical and analytical validity and clinical utility, or make us repeat aspects of the trial or initiate new trials.

Because our companion diagnostic candidates are at an early stage of development, we cannot yet know what the FDA will require for any of these tests. For four of our six most advanced product candidates, MM-121, MM-111, MM-151 and MM-141, we are attempting to develop an *in vitro* companion diagnostic that will help identify patients likely to benefit from the therapy. Whether the FDA will consider these *in vitro* diagnostics to be *in vitro* companion diagnostic devices that require simultaneous approval or clearance with the therapeutics under the draft guidance will depend on whether the FDA views the diagnostics to be essential to the safety and efficacy of these therapeutics.

For our two other most advanced product candidates, MM-398 and MM-302, although we are also investigating possible *in vitro* companion diagnostics, we are currently developing *in vivo* companion diagnostics in the form of imaging agents that may help identify patients likely to benefit from the therapy. Imaging agents are regulated as drugs by the FDA's Center for Drug Evaluation and Research and, as such, are generally subject to the regulatory requirements applicable to other new drug candidates. Although the FDA has not issued guidance with respect to the simultaneous approval of *in vivo* diagnostics and therapeutics, it is possible that the FDA will apply a standard similar to that for *in vitro* diagnostics.

Based on the FDA's past practice with companion diagnostics, if we are successful in developing a companion diagnostic for any of our six most advanced product candidates, we would expect that FDA approval of an *in vitro* companion diagnostic, and possibly an *in vivo* companion diagnostic, would be required for approval and subsequent commercialization of each such therapeutic product candidate. We are not aware of any currently available diagnostics that, if necessary, would otherwise allow us to proceed with the approval and subsequent commercialization of our product candidates despite a delay in or failure of our attempts to develop companion diagnostics.

If we fail to maintain orphan drug exclusivity for MM-398 or MM-111, we will have to rely on other rights and protections for these product candidates.

We have obtained orphan drug designation in the United States and orphan medicinal product designation in the European Union for MM-398 for the treatment of pancreatic cancer and have obtained orphan drug designation in the United States for MM-111 for the treatment of esophageal cancer and of gastric and gastroesophageal junction cancers. In the United States, under the Orphan Drug Act, the FDA may designate a product as an orphan drug if it is a drug intended to treat a rare disease or condition, which is generally defined as a patient population of fewer than 200,000 individuals in the United States.

In the United States, the company that first obtains FDA approval for a designated orphan drug for the specified rare disease or condition receives orphan drug marketing exclusivity for that drug for a period of seven years. This orphan drug exclusivity prevents the FDA from approving another application, including a full NDA, to market the same drug for the same orphan indication, except in limited circumstances. For purposes of small molecule drugs, the FDA

defines the term "same drug" to mean a drug that contains the same active molecule and that is intended for the same use as the approved orphan drug. Orphan drug exclusivity may be lost if the

Table of Contents

FDA determines that the request for designation was materially defective or if the manufacturer is unable to assure sufficient quantity of the drug to meet the needs of patients with the rare disease or condition.

Even if we obtain orphan drug exclusivity for a product, that exclusivity may not effectively protect the product from competition because different drugs can be approved for the same condition. Even after an orphan drug is approved, the FDA can subsequently approve the same drug for the same condition if the FDA concludes that the later drug is clinically superior in that it is shown to be safer, more effective or makes a major contribution to patient care.

The EMA grants orphan medicinal product designation to promote the development of products that may offer therapeutic benefits for life-threatening or chronically debilitating conditions affecting not more than five in 10,000 people in the European Union. Orphan medicinal product designation from the EMA provides ten years of marketing exclusivity following drug approval, subject to reduction to six years if the designation criteria are no longer met.

Our therapeutic product candidates for which we intend to seek approval as biological or drug products may face competition sooner than expected.

With the enactment of the BPCIA as part of the Health Care and Education Reconciliation Act of 2010, or the Health Care Reform Law, an abbreviated pathway for the approval of biosimilar and interchangeable biological products was created. The abbreviated regulatory pathway establishes legal authority for the FDA to review and approve biosimilar biologics, including the possible designation of a biosimilar as interchangeable based on their similarity to existing brand product. Under the BPCIA, an application for a biosimilar product cannot be approved by the FDA until 12 years after the original branded product was approved under a BLA. The BPCIA is complex and is only beginning to be interpreted and implemented by the FDA. As a result, its ultimate impact, implementation and meaning is subject to uncertainty. While it is uncertain when any such processes may be fully adopted by the FDA, any such processes could have a material adverse effect on the future commercial prospects for our biological products.

We believe that any of our products approved as a biological product under a BLA should qualify for the 12-year period of exclusivity. However:

a potential competitor could seek and obtain approval of its own BLA during our exclusivity period instead of seeking approval of a biosimilar version; and

the FDA could consider a particular product candidate, such as MM-302, which contains both drug and biological product components, to be a drug subject to review pursuant to an NDA, and therefore eligible for a significantly shorter marketing exclusivity period as provided under the Drug Price Competition and Patent Term Restoration Act of 1984.

Moreover, the extent to which a biosimilar, once approved, will be substituted for any one of our reference products in a way that is similar to traditional generic substitution for non-biological products is not yet clear and will depend on a number of marketplace and regulatory factors that are still developing.

In addition, a drug product approved under an NDA, such as MM-398 if it were to be approved, could face generic competition earlier than expected. The enactment of the Generic Drug User Fee Amendments of 2012 as part of the FDASIA established a user fee program that will generate hundreds of millions of dollars in funding for the FDA's generic drug review program. Funding from the user fee program, along with performance goals that the FDA negotiated with the generic drug industry, could significantly decrease the timeframe for FDA review and approval of

generic drug applications.

Table of Contents

Failure to obtain regulatory approval in international jurisdictions would prevent us from marketing our products abroad.

We intend to market our products both within and outside the United States. In particular, we plan to market and sell ourselves any products for which we receive marketing approval in the European Union, rather than relying on third parties for these capabilities. This may increase the risks described below with respect to our compliance with foreign regulations.

In order to market and sell our products in the European Union and many other jurisdictions, we must obtain separate regulatory approvals and comply with numerous and varying regulatory requirements. The approval procedure varies among countries and can involve additional testing, including sometimes additional testing in children. The time required to obtain approval in foreign countries may differ substantially from that required to obtain FDA approval. The regulatory approval process outside the United States generally includes all of the risks associated with obtaining FDA approval. In addition, in many countries outside the United States, it is required that the product be approved for reimbursement before the product can be sold in that country. We may not obtain approvals from regulatory authorities outside the United States on a timely basis, if at all. Approval by the FDA does not ensure approval by regulatory authorities in other countries or jurisdictions, and approval by one regulatory authority outside the United States does not ensure approval by regulatory authorities in other countries or jurisdictions or by the FDA. We may not be able to file for regulatory approvals and may not receive necessary approvals to commercialize our products in any market.

Any product for which we obtain marketing approval could be subject to restrictions or withdrawal from the market and we may be subject to penalties if we fail to comply with regulatory requirements or if we experience unanticipated problems with our products, when and if any of them are approved.

Any product for which we obtain marketing approval, along with the manufacturing processes, post-approval clinical data, labeling, advertising and promotional activities for such product, will be subject to continual requirements of and review by the FDA and other regulatory authorities. These requirements include submissions of safety and other post-marketing information and reports, registration and listing requirements, cGMP or QSR requirements relating to quality control, quality assurance and corresponding maintenance of records and documents, requirements regarding the distribution of samples to physicians and recordkeeping. Even if regulatory approval of a product is granted, the approval may be subject to limitations on the indicated uses for which the product may be marketed or to the conditions of approval, or contain requirements for costly post-marketing testing and surveillance to monitor the safety or efficacy of the product. Later discovery of previously unknown problems with our products, manufacturers or manufacturing processes, or failure to comply with regulatory requirements, may result in actions such as:

restrictions on such products, manufacturers or manufacturing processes;

restrictions on the marketing of a product;

restrictions on product distribution;

requirements to conduct post-marketing clinical trials;

warning or untitled letters;

withdrawal of the products from the market;

refusal to approve pending applications or supplements to approved applications that we submit;

recall of products;

finest, restitution or disgorgement of profits or revenue;

suspension or withdrawal of regulatory approvals;

refusal to permit the import or export of our products;

product seizure; or

injunctions or the imposition of civil or criminal penalties.

Table of Contents

The FDASIA provides the FDA with new inspection authorities. A drug or biologic will be considered adulterated, with possible resulting civil and criminal penalties, if the owner or operator of the establishment where it is made, processed, packed or held delays, denies, limits or refuses inspection. The FDASIA also replaces the biennial inspection schedule for drugs and biologics with a risk-based inspection schedule. The law grants the FDA authority to require a drug or biologics manufacturer to provide, in advance or instead of an inspection, and at the manufacturer's expense, any records or other information that the agency may otherwise inspect at the facility. The FDASIA also permits the FDA to share inspection information with foreign governments under certain circumstances. The FDASIA is complex and has yet to be fully interpreted and implemented by the FDA. As a result, its ultimate impact, implementation and meaning are subject to uncertainty.

The FDASIA also provides the FDA with additional authority to exercise against manufacturers of drugs or biologics that are not adhering to pediatric study requirements, which apply even if the manufacturer is not seeking to market the drug or biologic to pediatric patients. As of April 2013, the FDA must issue non-compliance letters to companies who do not meet the pediatric study requirements. Any company receiving a non-compliance letter would have an opportunity to respond, and the non-compliance letter and company response would become publicly available.

Our relationships with customers and payors will be subject to applicable anti-kickback, fraud and abuse and other healthcare laws and regulations, which could expose us to criminal sanctions, civil penalties, contractual damages, reputational harm and diminished profits and future earnings.

Healthcare providers, physicians and others play a primary role in the recommendation and prescription of any products for which we obtain marketing approval. Our future arrangements with third-party payors and customers may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we market, sell and distribute our products for which we obtain marketing approval. Restrictions under applicable federal and state healthcare laws and regulations include the following:

the federal healthcare anti-kickback statute prohibits, among other things, persons from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made under federal healthcare programs such as Medicare and Medicaid;

the federal False Claims Act imposes criminal and civil penalties, including civil whistleblower or qui tam actions, against individuals or entities for knowingly presenting, or causing to be presented, to the federal government, claims for payment that are false or fraudulent or making a false statement to avoid, decrease or conceal an obligation to pay money to the federal government;

the federal Health Insurance Portability and Accountability Act of 1996, as amended by the Health Information Technology for Economic and Clinical Health Act, imposes criminal and civil liability for executing a scheme to defraud any healthcare benefit program and also imposes obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information;

the federal false statements statute prohibits knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statement in connection with the delivery of or payment for healthcare benefits, items or services;

the federal transparency requirements under the Health Care Reform Law requires manufacturers of drugs, devices, biologics and medical supplies to report to the Department of Health and Human Services information related to physician payments and other transfers of value and physician ownership and investment interests; and

Table of Contents

analogous state laws and regulations, such as state anti-kickback and false claims laws, may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers, and some state laws require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government in addition to requiring manufacturers to report information related to payments to physicians and other health care providers or marketing expenditures.

Efforts to ensure that our business arrangements with third parties will comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our business practices may not comply with current or future statutes, regulations or case law involving applicable fraud and abuse or other healthcare laws and regulations. If our operations are found to be in violation of any of these laws or any other governmental regulations that may apply to us, we may be subject to significant civil, criminal and administrative penalties, damages, fines, exclusion from government funded healthcare programs, such as Medicare and Medicaid, and the curtailment or restructuring of our operations. If any of the physicians or other providers or entities with whom we expect to do business with are found to be not in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs.

Recently enacted and future legislation may increase the difficulty and cost for us to obtain marketing approval of and commercialize our product candidates and affect the prices we may obtain.

In the United States and some foreign jurisdictions, there have been a number of legislative and regulatory changes and proposed changes regarding the healthcare system that could prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our ability to profitably sell any products for which we obtain marketing approval.

In the United States, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, or the Medicare Modernization Act, changed the way Medicare covers and pays for pharmaceutical products. The legislation expanded Medicare coverage for drug purchases by the elderly and introduced a new reimbursement methodology based on average sales prices for physician administered drugs. In addition, this legislation provided authority for limiting the number of drugs that will be covered in any therapeutic class. Cost reduction initiatives and other provisions of this legislation could decrease the coverage and price that we receive for any approved products. While the Medicare Modernization Act applies only to drug benefits for Medicare beneficiaries, private payors often follow Medicare coverage policy and payment limitations in setting their own reimbursement rates. Therefore, any reduction in reimbursement that results from the Medicare Modernization Act may result in a similar reduction in payments from private payors.

Moreover, in March 2010, President Obama signed into law the Health Care Reform Law, a sweeping law intended to broaden access to health insurance, reduce or constrain the growth of healthcare spending, enhance remedies against fraud and abuse, add new transparency requirements for health care and health insurance industries, impose new taxes and fees on the health industry and impose additional health policy reforms. Effective October 1, 2010, the Health Care Reform Law revises the definition of average manufacturer price for reporting purposes, which could increase the amount of Medicaid drug rebates to states. Further, the new law imposes a significant annual fee on companies that manufacture or import branded prescription drug products. Substantial new provisions affecting compliance have also been enacted, which may affect our business practices with health care practitioners. We will not know the full effects of the Health Care Reform Law until all applicable federal and state agencies have issued regulations or guidance under the new law. Although it is too early to determine the effect of the Health Care Reform Law, the new law appears likely to continue the pressure on pharmaceutical pricing, especially under the Medicare program, and may also increase our regulatory burdens and operating costs.

Table of Contents

Most recently, on July 9, 2012, President Obama signed the FDASIA into law. The broad, sweeping law establishes new user fee programs and provides the FDA with new authority in the areas of drugs, biologics and medical devices. We are not certain what the full impact of these changes will be on our business, particularly as the FDA will need to publish regulations and issue guidances to implement the new legislation. We are not sure whether additional legislative changes will be enacted, or whether other FDA regulations, guidance or interpretations will be changed, or what the impact of such changes on the marketing approvals of our product candidates, if any, may be. In the area of companion diagnostics, FDA officials indicated in 2010 that the agency planned to issue two guidances in this area. The FDA issued one draft guidance in July 2011. The FDA has yet to issue a second draft guidance and may decide not to issue a second draft guidance. The FDA's expected issuance of a final guidance, or issuance of additional draft guidance, could affect our development of *in vitro* companion diagnostics and the applicable regulatory requirements. In addition, increased scrutiny by Congress of the FDA's approval process may significantly delay or prevent marketing approval, as well as subject us to more stringent product labeling and post-marketing testing and other requirements.

Risks Related to Employee Matters and Managing Growth

Our future success depends on our ability to retain our chief executive officer and other key executives and to attract, retain and motivate qualified personnel.

We are highly dependent on Robert J. Mulroy, our President and Chief Executive Officer, and the other principal members of our executive and scientific teams. Although we have formal employment agreements with each of our executive officers, these agreements do not prevent our executives from terminating their employment with us at any time. We do not maintain key person insurance for any of our executives or other employees. The loss of the services of any of these persons could impede the achievement of our research, development and commercialization objectives.

Recruiting and retaining qualified scientific, clinical, manufacturing and sales and marketing personnel will also be critical to our success. We may not be able to attract and retain these personnel on acceptable terms given the competition among numerous pharmaceutical and biotechnology companies for similar personnel. We also experience competition for the hiring of scientific and clinical personnel from universities and research institutions. In addition, we rely on consultants and advisors, including scientific and clinical advisors, to assist us in formulating our research and development and commercialization strategy. Our consultants and advisors may be employed by employers other than us and may have commitments under consulting or advisory contracts with other entities that may limit their availability to us.

We expect to expand our development, manufacturing, regulatory and sales and marketing capabilities, and as a result, we may encounter difficulties in managing our growth, which could disrupt our operations.

We expect to experience significant growth in the number of our employees and the scope of our operations, particularly in the areas of drug development, manufacturing, regulatory affairs and sales and marketing. To manage our anticipated future growth, we must continue to implement and improve our managerial, operational and financial systems, expand our facilities and continue to recruit and train additional qualified personnel. Due to our limited financial resources and the limited experience of our management team in managing a company with such anticipated growth, we may not be able to effectively manage the expansion of our operations or recruit and train additional qualified personnel. The physical expansion of our operations may lead to significant costs and may divert our management and business development resources. Any inability to manage growth could delay the execution of our business plans or disrupt our operations.

Table of Contents

We have entered into and may continue to enter into or seek to enter into business combinations and acquisitions which may be difficult to integrate, disrupt our business, divert management attention or dilute stockholder value.

As part of our business strategy, we may enter into business combinations and acquisitions. Although we acquired Hermes in October 2009, we have limited experience in making acquisitions. In addition, acquisitions are typically accompanied by a number of risks, including:

the difficulty of integrating the operations and personnel of the acquired companies;

the potential disruption of our ongoing business and distraction of management;

potential unknown liabilities and expenses;

the failure to achieve the expected benefits of the combination or acquisition;

the maintenance of acceptable standards, controls, procedures and policies; and

the impairment of relationships with employees as a result of any integration of new management and other personnel.

If we are not successful in completing acquisitions that we may pursue in the future, we would be required to reevaluate our business strategy and we may have incurred substantial expenses and devoted significant management time and resources in seeking to complete the acquisitions. In addition, with future acquisitions, we could use substantial portions of our available cash as all or a portion of the purchase price. As we did for the acquisition of Hermes, we could also issue additional securities as consideration for these acquisitions, which could cause our stockholders to suffer significant dilution.

Risks Related to Our Common Stock

Our executive officers, directors and principal stockholders maintain the ability to significantly influence all matters submitted to stockholders for approval.

Our executive officers, directors and stockholders who own more than 5% of our outstanding common stock, in the aggregate, beneficially own a large portion of our capital stock. As a result, if these stockholders were to choose to act together, they would be able to significantly influence all matters submitted to our stockholders for approval, as well as our management and affairs. For example, these persons, if they choose to act together, will significantly influence the election of directors and approval of any merger, consolidation or sale of all or substantially all of our assets. This concentration of voting power could allow, delay or prevent an acquisition of our company on terms that other stockholders may desire.

Provisions in our corporate charter documents and under Delaware law could make an acquisition of us, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or

remove our current management.

Provisions in our corporate charter and our bylaws may discourage, delay or prevent a merger, acquisition or other change in control of us that stockholders may consider favorable, including transactions in which you might otherwise receive a premium for your shares. These provisions could also limit the price that investors might be willing to pay in the future for shares of our common stock, thereby depressing the market price of our common stock. In addition, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors. Because our board of directors is responsible for appointing the members of our management team, these provisions could in turn affect any attempt by our stockholders to replace current members of our management team. Among others, these provisions:

allow the authorized number of our directors to be changed only by resolution of our board of directors;

establish advance notice requirements for stockholder proposals that can be acted on at stockholder meetings and nominations to our board of directors;

Table of Contents

require that stockholder actions must be effected at a duly called stockholder meeting and prohibit actions by our stockholders by written consent;

limit who may call stockholder meetings;

authorize our board of directors to issue preferred stock without stockholder approval, which could be used to institute a poison pill that would work to dilute the stock ownership of a potential hostile acquirer, effectively preventing acquisitions that have not been approved by our board of directors; and

require the approval of the holders of at least 75% of the votes that all our stockholders would be entitled to cast to amend or repeal certain provisions of our charter or bylaws.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which prohibits a person who owns in excess of 15% of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired in excess of 15% of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner.

Further, the repurchase right under the convertible senior notes in connection with a fundamental change (as defined therein) and any increase in the conversion rate in connection with a make-whole fundamental change could also discourage a potential acquirer.

Our stock price has been and may in the future be volatile, which could cause holders of our common stock to incur substantial losses.

Our stock price has been and in the future may be subject to substantial price volatility. The stock market in general and the market for biotechnology companies in particular have experienced extreme volatility that has often been unrelated to the operating performance of particular companies. As a result of this volatility, our stockholders could incur substantial losses. The market price for our common stock may be influenced by many factors, including:

the success of competitive products or technologies;

results of clinical trials of our product candidates or those of our competitors;

regulatory or legal developments in the United States and other countries;

developments or disputes concerning patents or other proprietary rights;

the recruitment or departure of key personnel;

variations in our financial results or those of companies that are perceived to be similar to us;

changes in the structure of healthcare payment systems;

market conditions in the pharmaceutical and biotechnology sectors and issuance of new or changed securities analysts' reports or recommendations;

general economic, industry and market conditions; and

the other factors described in this "Risk Factors" section.

Because we do not anticipate paying any cash dividends on our common stock in the foreseeable future, capital appreciation, if any, will be the sole source of gain for holders of our common stock.

We have never declared or paid cash dividends on our common stock. We currently intend to retain all of our future earnings, if any, to finance the growth and development of our business. In addition, the terms of existing or any future debt agreements may preclude us from paying dividends. As a result, capital appreciation, if any, of our common stock will be the sole source of gain for holders of our common stock for the foreseeable future.

Table of Contents

We are an emerging growth company and our election to delay adoption of new or revised accounting standards applicable to public companies may result in our financial statements not being comparable to those of other public companies. As a result of this and other reduced disclosure requirements applicable to emerging growth companies, our common stock may be less attractive to investors.

We are an emerging growth company, as defined in the JOBS Act, and may remain an emerging growth company for up to five years, until December 31, 2017, although if the market value of our common stock that is held by non-affiliates exceeds \$700 million as of any June 30 before that time or if we have annual gross revenues of \$1 billion or more in any fiscal year, we would cease to be an emerging growth company as of December 31 of the applicable year. For so long as we remain an emerging growth company, we are permitted and intend to rely on exemptions from certain reporting requirements that are applicable to other public companies that are not emerging growth companies. These exemptions include but are not limited to not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, not being required to comply with any requirement that may be adopted by the Public Company Accounting Oversight B