IMMUNOGEN INC
Form 424B5
May 06, 2010

Use these links to rapidly review the document
Table of contents
TABLE OF CONTENTS

Table of Contents

Subject to completion, dated May 5, 2010

The information in this prospectus supplement is not complete and may be changed. This prospectus supplement and the accompanying prospectus are not offers to sell these securities, and we are not soliciting offers to buy these securities in any jurisdiction where the offer or sale is not permitted.

Filed pursuant to Rule 424(b)(5)
Registration No. 333-165981

Preliminary prospectus supplement
(to prospectus dated April 22, 2010)

8,500,000 shares

Common stock

We are offering 8,500,000 shares of our common stock.

Our common stock is listed on the Nasdaq Global Market under the symbol "IMGN." The last reported sale price of our common stock on May 4, 2010 was $10.25 per share.

	Per share	Total
Public offering price	$	$
Underwriting discounts	$	$
Proceeds to us, before expenses	$	$

We have granted the underwriters an option for a period of 30 days from the date of this prospectus to purchase up to 1,275,000 additional shares of our common stock at the public offering price less the underwriting discounts to cover over-allotments, if any.

Investing in our common stock involves a high degree of risk. See "Risk factors" beginning on page S-10 of this prospectus supplement.

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

The underwriters expect to deliver shares on or about May , 2010.

J.P.Morgan

May , 2010

Table of Contents

Table of contents

You should rely only on the information contained or incorporated by reference in this prospectus supplement, the accompanying prospectus or any free writing prospectus that we have authorized for use in connection with this offering. Neither we nor the underwriters have authorized anyone to provide you with information different from that contained in this prospectus or any accompanying free writing prospectus. We are offering to sell, and seeking offers to buy, common stock only in jurisdictions where offers and sales are permitted. The information contained in this prospectus supplement, the accompanying prospectus and any accompanying free writing prospectus is accurate only as of the date of this prospectus supplement, the accompanying prospectus and any such accompanying free writing prospectus, regardless of the time of delivery of this prospectus supplement, the

Table of Contents

accompanying prospectus, any such accompanying free writing prospectus or of any sale of our common stock.

No action is being taken in any jurisdiction outside the United States to permit a public offering of the common stock or possession or distribution of this prospectus supplement, the accompanying prospectus or any free writing prospectus in that jurisdiction. Persons who come into possession of this prospectus supplement, the accompanying prospectus or any free writing prospectus in jurisdictions outside the United States are required to inform themselves about and to observe any restrictions as to this offering and the distribution of this prospectus supplement, the accompanying prospectus and any accompanying free writing prospectus applicable to that jurisdiction.

Table of Contents

About this prospectus supplement

On April 9, 2010, we filed with the Securities and Exchange Commission, or SEC, a registration statement on Form S-3 (File No. 333-165981) utilizing a shelf registration process relating to the securities described in this prospectus supplement, which registration statement was declared effective on April 22, 2010. Under this shelf registration process, we may, from time to time, sell up to $125,000,000 of common stock and other securities, of which this offering is a part.

This document is in two parts. The first part is this prospectus supplement, which describes the specific terms of this common stock offering and also adds to and updates information contained in the accompanying prospectus and the documents incorporated by reference into the prospectus. The second part, the accompanying prospectus, gives more general information, some of which does not apply to this offering. Generally, when we refer to this prospectus, we are referring to both parts of this document combined.

If the description of the offering varies between this prospectus supplement and the accompanying prospectus, you should rely on the information contained in this prospectus supplement. However, if any statement in one of these documents is inconsistent with a statement in another document having a later date for example, a document incorporated by reference in the accompanying prospectus the statement in the document having the later date modifies or supersedes the earlier statement.

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

Unless we have indicated otherwise, or the context otherwise requires, references in this prospectus supplement and the accompanying prospectus to "ImmunoGen," "the Company," "we," "us" and "our" or similar terms are to ImmunoGen, Inc. and its subsidiaries.

Table of Contents

Prospectus supplement summary

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

Company overview

We develop novel, targeted therapeutics for the treatment of cancer using our expertise in cancer biology, monoclonal antibodies, highly potent cytotoxic, or cell-killing, agents, and the design of linkers that enable these agents to be stably attached to the antibodies while in the blood stream and released in their fully active form after delivery to a cancer cell. An anticancer compound made using our Targeted Antibody Payload, or TAP, technology consists of a monoclonal antibody that binds specifically to an antigen target found on cancer cells with multiple copies of one of our proprietary cell-killing agents attached using one of our engineered linkers. Its antibody component enables a TAP compound to bind specifically to cancer cells that express a particular target antigen, the highly potent cytotoxic agent serves to kill the cancer cell, and the engineered linker controls the release and activation of the cytotoxic agent inside the cancer cell. Our TAP technology is designed to enable the creation of highly effective, well-tolerated anticancer products.

We believe that our TAP technology and our expertise in the development and humanization of monoclonal antibodies will enable us to become a leader in the application of antibody-based anticancer compounds. We plan to achieve this goal through the development of our own anticancer products and through collaborations with other companies. There are now six TAP compounds in clinical trials through our own programs and those of several of our collaborators. Our collaborators currently include: Amgen, Bayer HealthCare, Biogen Idec, Biotest, Genentech (a wholly owned member of the Roche Group) and sanofi-aventis.

On April 29, 2010, we reported our financial results for the third quarter of fiscal year 2010, ended March 31, 2010, including a balance of cash and marketable securities of approximately $42.2 million.

Our product candidates

T-DM1

The most advanced compound in our pipeline is trastuzumab-DM1, or T-DM1, which is in global development by Roche for the treatment of HER2+ metastatic breast cancer, or MBC. T-DM1 consists of our DM1 cell-killing agent attached to trastuzumab, which is the active component of the marketed anticancer compound, Herceptin®. Herceptin was developed by Genentech, a wholly owned member of the Roche Group.

In April 2010, Roche reported that, based on discussions with the U.S. Food and Drug Administration, or FDA, Roche plans to submit a marketing application to the FDA for T-DM1 for the treatment of third-line or later HER2+ MBC in the United States in 2010. Assuming

Table of Contents

Roche submits its application in 2010, we believe Roche could receive marketing approval for T-DM1 in the United States in late 2010 or early 2011. Roche noted that the basis for this application is to be the Phase II clinical trial that was reported at the San Antonio Breast Cancer Symposium, or SABCS, in December 2009 that was designed to enroll 100 patients.

This Phase II clinical trial enrolled 110 patients with advanced HER2+ MBC that had undergone prior treatment with regimens that included an anthracycline, a taxane, Herceptin, Tykerb® and Xeloda®. The T-DM1 objective response rate, or ORR, was 32.7%, as assessed by an independent review facility, or IRF. ORR is the proportion of patients in the trial who had a durable complete or partial response to treatment with T-DM1, and was the primary endpoint of the trial. The clinical benefit rate, or CBR, was 44.5%, as assessed by an IRF. CBR includes patients who had stable disease for six months or longer as well as patients who had an objective response to T-DM1. The percentage of patients treated with T-DM1 whose best response was assessed to be progressive disease, which we categorize as not having had clinical benefit, was 18.2%. Data from this clinical trial also suggested that T-DM1 could provide better tolerability than standard chemotherapy-containing treatment regimens. The toxicities of T-DM1 reported were considered to be acceptable, manageable and consistent with those reported in other T-DM1 trials.

Roche has discussed other clinical trials that are planned or underway with T-DM1, including:

- A Phase III clinical trial (EMILIA) that compares T-DM1 used alone to Tykerb used together with Xeloda as second-line therapy for HER2+ MBC. This trial is designed to enroll 580 patients, and its primary endpoint is progression-free survival. The trial commenced in February 2009, and Roche has disclosed that this trial could lead to a potential regulatory submission with the FDA and in the European Union during 2012 for T-DM1 for second-line use in HER2+ MBC. We believe that Roche will provide information related to this trial during 2010, such as an update on the status of patient enrollment.

- A Phase III clinical trial (MARIANNE) to assess T-DM1 as a first-line treatment for HER2+ MBC. The trial will assess T-DM1 used alone against T-DM1 used together with pertuzumab and against Herceptin used together with a taxane and is designed to enroll 1,092 patients. Roche has indicated that this trial is expected to commence in the second half of 2010 and will have as a primary endpoint progression-free survival. Roche has disclosed that this trial could lead to a potential regulatory submission for T-DM1 use as a first-line treatment for HER2+ MBC, and the timing would be after 2013, the latest period of its projections.

- A Phase II clinical trial assessing T-DM1 as a first-line therapy for HER2+ MBC that compares T-DM1 used alone against trastuzumab used together with docetaxel. This trial is designed to include 120 patients, and its primary endpoint is progression-free survival. Roche has indicated that it expects to report preliminary data from this trial at the European Society for Medical Oncology, or ESMO, annual meeting in October 2010.

- A Phase Ib/II clinical trial assessing the tolerability of T-DM1 used together with pertuzumab. This trial was designed to enroll 40 patients. Findings from this trial have been accepted to be reported at the American Society of Clinical Oncology, or ASCO, meeting in June 2010.

In addition to the trials discussed above, several studies are underway that assess T-DM1 used in combination with other anticancer agents. We believe that additional clinical data with T-DM1, used alone or in combination, will be reported at SABCS in December 2010.

Table of Contents

Roche has indicated that it believes that peak T-DM1 sales, if it is approved, could be between 2 and 5 billion Swiss francs annually. Roche has reported that there are approximately 6,100 HER2+ MBC patients in the United States that are eligible for second-line treatments and approximately 8,300 such patients in five major markets in the European Union, and that there approximately 7,600 HER2+ MBC patients in the United States that are eligible for third-line and later treatments and approximately 5,450 such patients in five major markets in the European Union. We believe that T-DM1 has the potential to be a valuable new pharmaceutical for the treatment of patients with HER2+ MBC.

Lorvotuzumab mertansine

Our most advanced wholly owned compound is lorvotuzumab mertansine, which we previously called IMGN901. The target for this TAP compound, CD56, is found on a number of tumor types, including small-cell lung cancer, ovarian cancer, Merkel cell carcinoma and the liquid tumor, multiple myeloma. We believe lorvotuzumab mertansine has the potential to be the first effective antibody-based therapy for the treatment of these targeted cancers. Based on scientific literature and/or our own studies, we believe that CD56 is expressed on approximately 100% of small-cell lung cancer and Merkel cell carcinoma cases, 58% of ovarian cancer cases, and 70% of multiple myeloma cases. Based on American Cancer Society estimates, we believe that approximately 43,900 new cases of small-cell lung cancer, 21,550 new cases of ovarian cancer and 20,580 new cases of multiple myeloma will be diagnosed in the United States in 2010. Based on other published data, we believe approximately 1,900 new cases of Merkel cell carcinoma will be diagnosed in the United States in 2010. In the case of small-cell lung cancer newly diagnosed patients generally respond to their first treatment regimen, but typically their disease then recurs. While many patients with recurrent small-cell lung cancer could be eligible for additional treatment, survival at this stage is usually less than 6 months. Metastatic Merkel cell carcinoma is also associated with a poor outcome, with a median survival time of 6.8 months. Therefore, there is an unmet medical need to treat these patient populations.

We are evaluating lorvotuzumab mertansine for the treatment of CD56+ cancers, focusing on small-cell lung cancer, Merkel cell carcinoma and ovarian cancer in a two-phase Phase I clinical trial that we call Study 002. This trial was designed to determine the maximum tolerated dose of lorvotuzumab mertansine when dosed daily for three consecutive days in a 21-day cycle and then expand into the second phase, or expansion phase, designed to gain additional experience with lorvotuzumab mertansine when dosed at the previously determined maximum tolerable dose. We are encouraged by the findings to date. We plan to use data from the Phase I clinical trial, together with input gained from regulatory agencies, to make a decision in late 2010 as to whether to commence a pivotal Phase II clinical trial of lorvotuzumab mertansine for the treatment of Merkel cell carcinoma in 2011. We also expect that findings from the ongoing clinical trial will help inform our future evaluation of the compound for ovarian cancer, a more prevalent cancer than Merkel cell carcinoma.

In November 2009, we reported interim results from Study 002 with respect to the six patients with Merkel cell carcinoma that had received lorvotuzumab mertansine at that time. All of these patients had received prior chemotherapy regimens for their cancer and entered the trial with metastatic disease. Two of these six patients had a marked, objective response to treatment with lorvotuzumab mertansine, while a third patient had clinically relevant stable disease for this patient population. One of these three patients had a partial response, or PR, after the first lorvotuzumab mertansine treatment cycle and reached a complete response, or

Table of Contents

CR, by the end of the third treatment cycle. This patient has been in remission for more than four years. The second patient had marked tumor reduction after the first lorvotuzumab mertansine treatment cycle, but declined further therapy due to the occurrence of an adverse event. This patient had a confirmed PR and based on clinical exam has shown continued improvement in her tumors for over eight months. The third patient entered this Phase I trial with bone metastases and had previously been treated with three different combination regimens of chemotherapy. On treatment with lorvotuzumab mertansine, this patient had stable disease that lasted for 79 days. Lorvotuzumab mertansine was found to be generally well tolerated. In the dose-escalation phase of this trial, the maximum tolerated dose was established at 75 mg/m^2/day. We are now dosing patients at 60 mg/m^2/day in the expansion phase of Study 002 to gain additional experience with the compound when administered at that dose. We are submitting an abstract with updated findings from Study 002 for presentation at the ESMO annual meeting in October 2010.

In July 2009, we reported findings for the 68 small-cell lung cancer patients that had been treated to date with lorvotuzumab mertansine in either Study 002 or in another of our Phase I trials, called Study 001. All of these patients had received prior chemotherapy, and most had received at least two previous regimens. The estimated clinical benefit rate was 25%, consisting of patients with an objective response and/or sustained stable disease, defined as non-progression for at least 77 days. An objective response was reported in a patient whose small-cell lung cancer had recurred within four months of treatment with cisplatin, etoposide, and topotecan plus radiation therapy. This patient had a PR after his first lorvotuzumab mertansine treatment cycle and reached a 91% reduction in tumor size by the end of his third cycle. His disease progressed after his fourth cycle, which was 24 weeks after he first received lorvotuzumab mertansine. Another patient had an objective response (an unconfirmed PR) and no evidence of disease progression for more than 8 weeks. This patient had previously undergone two other treatment regimens for the cancer. Fifteen patients had sustained stable disease, with an estimated time-to-progression, or TTP, ranging from 77 to 168 days, or 11 to 24 weeks. Lorvotuzumab mertansine was found to be generally well tolerated.

In December 2009, we reported at the annual meeting of the American Society of Hematology, or ASH, interim results from our Phase I clinical trial, called Study 003, that assesses lorvotuzumab mertansine when used alone to treat multiple myeloma that has progressed on approved therapies. The findings reported were for the 26 patients enrolled in this trial at that time. One patient had a PR while receiving lorvotuzumab mertansine. This patient has continued on treatment for more than a year. Three patients had a minimal response, or MR, while receiving lorvotuzumab mertansine and two of these patients remained on treatment for at least 45 weeks. The third patient withdrew from the trial due to a broken leg while continuing to show disease improvement. Eleven patients had stable disease, or SD, with eight of these patients remaining on treatment for at least 12 weeks at the time of data cut-off for presentation of the data. These include four patients who have received lorvotuzumab mertansine for at least 24 weeks and two other patients still undergoing treatment. Ten patients remained on lorvotuzumab mertansine longer than on regimens received earlier in the course of their disease, and eight of these patients were on lorvotuzumab mertansine longer than on their last regimen with approved therapies. Lorvotuzumab mertansine was found to be generally well tolerated and was not associated with significant myelosuppression or other side effects that would limit its ability to be administered in combination with other active agents. Lorvotuzumab mertansine was granted orphan drug designation in the United States

Table of Contents

and similar designation in the European Union for Merkel cell carcinoma in early 2010. If a product that has orphan drug designation subsequently receives the first FDA approval for the disease for which it has such designation, the product is entitled to orphan product exclusivity, which means that the FDA may not approve any other applications to market the same drug for the same indication, except in very limited circumstances, for seven years.

In addition to the trial information discussed above, we are actively engaged in several other planned and ongoing clinical trials with lorvotuzumab mertansine, including:

- A Phase I/II clinical trial, called Study 007, to assess the safety and provide information on the efficacy of lorvotuzumab mertansine when used in combination with etoposide/carboplatin as a first-line treatment of small-cell lung cancer. We plan to commence this trial by late 2010. Assuming satisfactory safety data are obtained in the first phase of this trial, we plan to randomize patients during the second phase of this trial to compare lorvotuzumab mertansine used with etoposide/carboplatin against etoposide/carboplatin used alone, which is the current standard of care for first-line treatment of small-cell lung cancer.

- Two Phase I clinical trials evaluating lorvotuzumab mertansine for the treatment of multiple myeloma are underway. Study 003, as has been discussed, evaluates lorvotuzumab mertansine when used as a single agent and is currently in the expansion phase. Study 005 is designed to assess the tolerability of lorvotuzumab and gain information on its efficacy when used in combination with the standard treatment for this cancer, lenalidomide plus dexamethasone. We expect to report interim data from one or both of these trials at the ASH annual meeting in December 2010.

- We plan to make a decision in late 2010 on whether to commence a pivotal Phase II clinical trial of lorvotuzumab mertansine for the treatment of Merkel cell carcinoma. This decision will be informed by a number of considerations, including additional findings in Study 002 and the input obtained from regulatory agencies on trial design.

SAR3419

We created SAR3419 for the treatment of non-Hodgkin's lymphoma and licensed it to sanofi-aventis as part of a broader collaboration. SAR3419 consists of our DM4 cell-killing agent attached using one of our engineered linkers to a CD19-binding antibody that was created and humanized by us.

Sanofi-aventis is evaluating SAR3419 for the treatment of non-Hodgkin's lymphoma in two Phase I clinical trials that have different dosing schedules. The first study evaluated the compound when dosed once every three weeks and initial findings from it have been reported. We expect data from the second Phase I trial, which evaluates the compound when dosed weekly, to be reported at the ASH annual meeting in December 2010. We expect SAR3419 to advance into Phase II clinical testing in the second half of 2010.

The findings from the first Phase I clinical trial were reported at the ASH annual meeting in December 2009 The trial found that 17 of 27 of patients, or 63%, who were response-evaluable at the time of data cut-off for presentation experienced a reduction in tumor size (7% to 86% reduction). These included 7 of 14 patients, or 50%, who had disease that was refractory to treatment with rituximab. Five patients had an objective response, all of whom received SAR3419 at its maximum tolerated dose or the next highest or lowest dose. Among these

Table of Contents

responders was a patient with rituximab-refractory disease. All but one of these five patients reached the best response either during the last treatment cycle allowed under the trial protocol, which was cycle 6, or after their last dose of SAR3419. This is consistent with the observation that the best response to treatment typically occurred after a patient had received several doses of SAR3419. A primary endpoint of the trial was to establish the maximum tolerable dose of SAR3419 when administered once every three weeks. This was determined to be 160 mg/m^2. Additional patients will receive SAR3419 at this dose to gain more information on the tolerability and activity of the compound when administered at its maximum tolerable dose.

Other product candidates under development

In addition to T-DM1, lorvotuzumab mertansine and SAR3419, several other TAP compounds are in development through our own programs and those of our partners, including:

Proprietary ImmunoGen product candidates

IMGN388 is a TAP compound consisting of our DM4 cell-killing agent attached to an integrin-targeting antibody that was developed by Centocor. IMGN388's target occurs on many types of solid tumors and also on vascular endothelial cells in the process of forming new blood vessels, or angiogenesis. Angiogenesis is needed for a tumor to grow. IMGN388 is in Phase I testing and clinical data from this trial have been accepted for poster presentation at ASCO in June 2010.

We have three TAP compounds currently in or positioned to begin preclinical toxicology studies. One of these compounds, IMGN529, is being developed for the treatment of certain liquid tumors and we expect to submit an investigational new drug, or IND, application to the FDA for this product candidate in 2011. One of the other compounds is a potential treatment for certain liquid tumors and the other is a potential treatment for certain solid tumors.

Partnered product candidates

BT-062 was created by Biotest under a 2006 license that grants Biotest the exclusive right to use our maytansinoid TAP technology with antibodies that target CD138, an antigen found on multiple myeloma and certain other cancers. BT-062 consists of Biotest's anti-CD138 antibody with our DM4 cell-killing agent attached using one of our engineered linkers. Biotest advanced BT-062 into Phase I evaluation in September 2008 and initial results from this trial were reported at the ASH annual meeting in 2009. We have opt-in rights on BT-062 for the United States.

BIIB015 was created by Biogen Idec under a 2004 license that grants Biogen Idec the exclusive right to use our maytansinoid TAP technology with antibodies that target Cripto, an antigen found on a number of solid tumors. BIIB015 consists of Biogen Idec's Cripto-binding antibody with our DM4 cell-killing agent attached using one of our engineered linkers. BIIB015 advanced into Phase I testing in the summer of 2008.

We expect two compounds to advance into clinical testing in 2010 through our collaboration with sanofi-aventis.

Table of Contents

In October 2008, we entered into a development and license agreement with Bayer HealthCare AG. The agreement grants Bayer HealthCare exclusive rights to use our maytansinoid TAP technology to develop and commercialize therapeutic compounds to a specific target. We recently achieved a milestone payment for their achievement of a preclinical event under this collaboration.

Amgen has taken two licenses to use our TAP technology with antibodies to undisclosed targets, and Genentech, now a wholly owned member of the Roche Group, has taken four licenses in addition to the HER2 license that enabled development of T-DM1.

We continue to conduct research to develop additional cell-killing agents and linkers to further strengthen our position in the field, and expect over the next several years to be involved in numerous clinical trials for existing and new product candidates focused on various stages of development ranging from early stage to registration trials. We believe our continued focus on development of additional applications of our TAP technology could provide additional opportunities for partnerships and collaborations.

Our TAP technology

We developed our TAP technology to achieve highly effective, well tolerated anticancer drugs. Terms used to refer to our field include armed antibodies, empowered antibodies and antibody-drug conjugates, or ADCs. Our TAP technology and/or antibody expertise has generated over $230 million in payments to us from our partners since 2000. Our existing collaboration and license agreements with partners have the potential to generate approximately $565 million in additional payments to us in connection with potential development, clinical and regulatory milestones.

Traditional chemotherapy agents typically kill any rapidly dividing cell, including healthy cells, which can result in significant adverse side effects and limit their ability to be dosed to full efficacy. Monoclonal antibodies can be created that bind specifically to targets found on cancer cells and, therefore, offer the potential to selectively target cancer cells. The invention of such antibodies has led to the creation of some successful anticancer therapeutics such as Rituxan® and Herceptin®. For many of the antigens found on cancer cells, however, the binding of a manufactured antibody to that antigen in and of itself has little, if any, anticancer effect.

Our TAP technology makes use of the targeting ability of monoclonal antibodies without needing the antibody to have meaningful anticancer activity on its own. A TAP compound consists of a tumor-targeting antibody with one of our highly potent cell-killing agents attached using one of our engineered linkers. The antibody serves to deliver our potent cell-killing agent specifically to cancer cells, to help minimize damage to healthy tissue. The cell-killing agent serves to kill the cancer cell. Our agents are far more potent than traditional chemotherapies. Our engineered linkers serve to keep the cell-killing agent attached to the antibody while the TAP compound is circulating in the bloodstream and then control its release once the TAP compound has bound to and entered a cancer cell.

We develop our own monoclonal antibodies for use in our proprietary products and also license to other companies the right to use our TAP technology with their antibodies to develop products for specific targets.

Table of Contents

Corporate information

We were organized as a Massachusetts corporation in March 1981. Our principal offices are located at 830 Winter Street, Waltham, Massachusetts 02451, and our telephone number is (781) 895-0600. We maintain a web site at *www.immunogen.com*, where certain information about us is available. Please note that the information contained on the website is not a part of this document.

Herceptin® is a registered trademark of Genentech, a wholly owned member of the Roche Group. Rituxan® is a registered trademark of Biogen Idec Inc. Tykerb® is a registered trademark of GlaxoSmithKline plc. Xeloda® is a registered trademark of Roche. Other brands, names and trademarks contained in this prospectus supplement, the accompanying prospectus or the documents incorporated by reference herein and therein are the property of their respective owners.

Table of Contents

The offering

Common stock offered by us in this offering	8,500,000 shares
Over-allotment option	1,275,000 shares
Common stock to be outstanding after the offering	65,914,478 shares (or 67,189,478 shares if the over-allotment option is exercised in full)
Use of proceeds	We intend to use the net proceeds of this offering for our operations, including, but not limited to, general corporate purposes, which may include research and development expenditures, clinical trial expenditures, manufacture and supply of drug substance and drug products, acquisitions of new technologies, capital expenditures and working capital. See "Use of Proceeds" on page S-29.
Risk factors	See "Risk Factors" beginning on page S-10 and other information included or incorporated by reference in this prospectus for a discussion of factors you should carefully consider before deciding to invest in shares of our common stock.
Nasdaq Global Market symbol	IMGN

The number of shares to be outstanding after this offering is based on 57,414,478 shares of common stock outstanding as of March 31, 2010. It does not include:

- 6,299,561 shares of our common stock issuable upon exercise of stock options outstanding as of March 31, 2010 under our stock option plans as of that date, at a weighted average exercise price of $7.01;
- 223,306 shares of our common stock issuable upon redemption of deferred stock units by non-employee directors as of March 31, 2010; and
- 1,453,893 shares of our common stock available as of March 31, 2010 for future grant or issuance pursuant to our stock-based plans for employees, directors and consultants.

Unless otherwise indicated, all information in this prospectus supplement assumes that the underwriters will not exercise the over-allotment option granted to them by us.

Table of Contents

Risk factors

Investing in our common stock involves a high degree of risk and uncertainty. You should carefully consider the following risk factors and all other information contained in this prospectus supplement and the accompanying prospectus and incorporated by reference into this prospectus supplement and the accompanying prospectus before purchasing our common stock. The risks and uncertainties described below are not the only ones facing us. Additional risks and uncertainties that we are unaware of, or that we currently deem immaterial, also may become important factors that affect us. If any of such risks or the risks described below occur, our business, financial condition or results of operations could be materially and adversely affected. In that case, the trading price of our common stock could decline, and you may lose some or all of your investment.

Risks related to our business

We have a history of operating losses and expect to incur significant additional operating losses.

We have generated operating losses since our inception. As of March 31, 2010, we had an accumulated deficit of $359 million. For the nine months ended March 31, 2010 and 2009, we generated losses of $37.5 million and $21.1 million, respectively, and for the years ended June 30, 2009, 2008 and 2007, we generated losses of $31.9 million, $32.0 million and $19.0 million, respectively. We may never be profitable. We expect to incur substantial additional operating expenses over the next several years as our research, development, preclinical testing, clinical trials and collaborator support activities continue. We intend to continue to invest significantly in our product candidates. Further, we expect to invest significant resources supporting our existing collaborators as they work to develop, test and commercialize TAP and other antibody compounds. We or our collaborators may encounter technological or regulatory difficulties as part of this development and commercialization process that we cannot overcome or remedy. We may also incur substantial marketing and other costs in the future if we decide to establish marketing and sales capabilities to commercialize our product candidates. None of our or our collaborators' product candidates has generated any commercial revenue and our only revenues to date have been primarily from upfront and milestone payments, research and development support and clinical materials reimbursement from our collaborative partners. We do not expect to generate revenues from the commercial sale of our product candidates or royalties on revenues from the commercial sale of our collaborators' product candidates in the near future, and we may never generate revenues from the commercial sale of products. Even if we do successfully develop products that can be marketed and sold commercially, we will need to generate significant revenues from those products to achieve and maintain profitability. Even if we do become profitable, we may not be able to sustain or increase profitability on a quarterly or annual basis.

If we are unable to obtain additional funding when needed, we may have to delay or scale back some of our programs or grant rights to third parties to develop and market our product candidates.

We will continue to expend substantial resources developing new and existing product candidates, including costs associated with research and development, acquiring new technologies, conducting preclinical studies and clinical trials, obtaining regulatory approvals

Table of Contents

and manufacturing products as well as providing certain support to our collaborators in the development of their products. We believe that our current working capital, not including the net proceeds of this offering, and future payments, if any, from our collaboration arrangements will be sufficient to meet our current and projected operating and capital requirements for the remainder of fiscal year 2010 and for fiscal year 2011. However, we may need additional financing sooner due to a number of factors including:

- if either we or any of our collaborators incur higher than expected costs or experience slower than expected progress in developing product candidates and obtaining regulatory approvals;
- lower revenues than expected under our collaboration agreements; or
- acquisition of technologies and other business opportunities that require financial commitments.

Additional funding may not be available to us on favorable terms, or at all. We may raise additional funds through public or private financings, collaborative arrangements or other arrangements. Debt financing, if available, may involve covenants that could restrict our business activities. If we are unable to raise additional funds through equity or debt financing when needed, we may be required to delay, scale back or eliminate expenditures for some of our development programs or grant rights to develop and market product candidates that we would otherwise prefer to internally develop and market. If we are required to grant such rights, the ultimate value of these product candidates to us may be reduced.

If our TAP technology does not produce safe, effective and commercially viable products, our business will be severely harmed.

Our TAP technology yields novel product candidates for the treatment of cancer. To date, no TAP product candidate has obtained regulatory approval and the most advanced TAP product candidate is in Phase III clinical testing. Our TAP product candidates and/or our collaborators' TAP product candidates may not prove to be safe, effective or commercially viable treatments for cancer and our TAP technology may not result in any future meaningful benefits to us or for our current or potential collaborative partners. Furthermore, we are aware of only one compound that is a conjugate of an antibody and a cytotoxic small molecule that has obtained approval by the FDA and is based on technology similar to our TAP technology. If our TAP technology fails to generate product candidates that are safe, effective and commercially viable treatments for cancer, or fails to obtain FDA approval, our business will be severely harmed.

Clinical trials for our and our collaborative partners' product candidates will be lengthy and expensive and their outcome is uncertain.

Before obtaining regulatory approval for the commercial sale of any product candidates, we and our collaborative partners must demonstrate through clinical testing that our product candidates are safe and effective for use in humans. Conducting clinical trials is a time-consuming, expensive and uncertain process and typically requires years to complete. The most advanced product candidate incorporating our TAP technology is in Phase III clinical testing. In our industry, the results from preclinical studies and early clinical trials often are not predictive of results obtained in later-stage clinical trials. Some compounds that have shown promising results in preclinical studies or early clinical trials subsequently fail to establish

Table of Contents

sufficient safety and efficacy data necessary to obtain regulatory approval. At any time during the clinical trials, we, our collaborative partners, or the FDA might delay or halt any clinical trials of our product candidates for various reasons, including:

- occurrence of unacceptable toxicities or side effects;
- ineffectiveness of the product candidate;
- insufficient drug supply;
- negative or inconclusive results from the clinical trials, or results that necessitate additional studies or clinical trials;
- delays in obtaining or maintaining required approvals from institutions, review boards or other reviewing entities at clinical sites;
- delays in patient enrollment;
- insufficient funding or a reprioritization of financial or other resources; or
- other reasons that are internal to the businesses of our collaborative partners, which they may not share with us.

Any failure or substantial delay in successfully completing clinical trials and obtaining regulatory approval for our product candidates or our collaborative partners' product candidates could severely harm our business.

Additionally, Roche has reported that, based on discussions with the FDA, Roche plans to submit a marketing application to the FDA for T-DM1 for the treatment of advanced HER2+ MBC in the United States in 2010 and Roche noted that the basis for this application is to be Phase II data of T-DM1 as a third-line treatment in HER2+ MBC. If approved, T-DM1 will be the first product incorporating our TAP technology available for commercial sale. However, if Roche delays the filing of this marketing application, the FDA does not approve T-DM1 on the basis of the Phase II results, or at all, or the results of the ongoing clinical trials of T-DM1 are not favorable, our business and financial condition could be materially adversely affected, which could have a negative impact on our stock price.

We and our collaborative partners are subject to extensive government regulations and we and our collaborative partners may not be able to obtain necessary regulatory approvals.

We and our collaborative partners may not receive the regulatory approvals necessary to commercialize our product candidates, which would cause our business to be severely harmed. Pharmaceutical product candidates, including those in development by us and our collaborative partners, are subject to extensive and rigorous government regulation. The FDA regulates, among other things, the development, testing, manufacture, safety, record-keeping, labeling, storage, approval, advertising, promotion, sale and distribution of pharmaceutical products. If our potential products or our collaborators' potential products are marketed abroad, they will also be subject to extensive regulation by foreign governments. None of our product candidates has been approved for sale in the United States or any foreign market. The regulatory review and approval process, which includes preclinical studies and clinical trials of each product candidate, is lengthy, complex, expensive and uncertain. Securing FDA approval requires the submission of extensive preclinical and clinical data and supporting information to

Table of Contents

the FDA for each indication to establish the product candidate's safety and efficacy. Data obtained from preclinical studies and clinical trials are susceptible to varying interpretation, which may delay, limit or prevent regulatory approval. The approval process may take many years to complete and may involve ongoing requirements for post-marketing studies. In light of the limited regulatory history of monoclonal antibody-based therapeutics, regulatory approvals for our or our collaborative partners' product candidates may not be obtained without lengthy delays, if at all. Any FDA or other regulatory approvals of our or our collaborative partners' product candidates, once obtained, may be withdrawn. The effect of government regulation may be to:

- delay marketing of potential products for a considerable period of time;
- limit the indicated uses for which potential products may be marketed;
- impose costly requirements on our activities; and
- place us at a competitive disadvantage to other pharmaceutical and biotechnology companies.

We may encounter delays or rejections in the regulatory approval process because of additional government regulation from future legislation or administrative action or changes in FDA policy during the period of product development, clinical trials and FDA regulatory review. Failure to comply with FDA or other applicable regulatory requirements may result in criminal prosecution, civil penalties, recall or seizure of products, total or partial suspension of production or injunction, as well as other regulatory action against our product candidates or us. Outside the United States, our ability to market a product is contingent upon receiving clearances from the appropriate regulatory authorities. The foreign regulatory approval process includes similar risks to those associated with the FDA approval process. In addition, we are, or may become, subject to various federal, state and local laws, regulations and recommendations relating to safe working conditions, laboratory and manufacturing practices, the experimental use of animals and the use and disposal of hazardous substances, including radioactive compounds and infectious disease agents, used in connection with our research work. If we fail to comply with the laws and regulations pertaining to our business, we may be subject to sanctions, including the temporary or permanent suspension of operations, product recalls, marketing restrictions and civil and criminal penalties.

Our and our collaborative partners' product candidates will remain subject to ongoing regulatory review even if they receive marketing approval. If we or our collaborative partners fail to comply with continuing regulations, we could lose these approvals and the sale of our products could be suspended.

Even if we or our collaborative partners receive regulatory approval to market a particular product candidate, the approval could be conditioned on us or our collaborative partners conducting costly post-approval studies or could limit the indicated uses included in product labeling. Moreover, the product may later cause adverse effects that limit or prevent its widespread use, force us or our collaborative partners to withdraw it from the market or impede or delay our or our collaborative partners' ability to obtain regulatory approvals in additional countries. In addition, the manufacturer of the product and its facilities will continue to be subject to FDA review and periodic inspections to ensure adherence to applicable regulations. After receiving marketing approval, the manufacturing, labeling,

Table of Contents

packaging, adverse event reporting, storage, advertising, promotion and record-keeping related to the product remain subject to extensive regulatory requirements. We or our collaborative partners may be slow to adapt, or we or our collaborative partners may never adapt, to changes in existing regulatory requirements or adoption of new regulatory requirements.

If we or our collaborative partners fail to comply with the regulatory requirements of the FDA and other applicable U.S. and foreign regulatory authorities, or if previously unknown problems with our or our partners' products, manufacturers or manufacturing processes are discovered, we could be subject to administrative or judicially imposed sanctions, including:

- restrictions on the products, manufacturers or manufacturing processes;
- warning letters;
- civil or criminal penalties;
- fines;
- injunctions;
- product seizures or detentions;
- import bans;
- voluntary or mandatory product recalls and publicity requirements;
- suspension or withdrawal of regulatory approvals;
- total or partial suspension of production; and
- refusal to approve pending applications for marketing approval of new drugs or supplements to approved applications.

Any one of these could have a material adverse effect on our business or financial condition.

If our collaborative partners fail to perform their obligations under our agreements with them, or determine not to continue with clinical trials for particular product candidates, our business could be severely impacted.

Our strategy for the development and commercialization of our product candidates depends, in large part, upon the formation and maintenance of collaborative arrangements. Collaborations provide an opportunity for us to:

- generate cash flow and revenue;

fund some of the costs associated with our internal research and development, preclinical testing, clinical trials and manufacturing;

seek and obtain regulatory approvals faster than we could on our own;

successfully commercialize existing and future product candidates; and

secure access to targets which, due to intellectual property restrictions, would otherwise be unavailable to our technology.

Table of Contents

If we fail to secure or maintain successful collaborative arrangements, the development and marketing of compounds that use our technology may be delayed, scaled back or otherwise may not occur. In addition, we may be unable to negotiate other collaborative arrangements or, if necessary, modify our existing arrangements on acceptable terms. We cannot control the amount and timing of resources our collaborative partners may devote to our product candidates. Our collaborative partners may separately pursue competing product candidates, therapeutic approaches or technologies to develop treatments for the diseases targeted by us or our collaborative efforts, or may decide, for reasons not known to us, to discontinue development of product candidates under our agreements with them. Any of our collaborative partners may slow or discontinue the development of a product candidate covered by a collaborative arrangement for reasons that can include, but are not limited to:

- a change in the collaborative partner's strategic focus as a result of merger, management changes, adverse business events or other causes;
- a change in the priority of the product candidate relative to other programs in the collaborator's pipeline;
- a reassessment of the patent situation related to the compound or its target;
- a change in the anticipated competition for the product candidate;
- preclinical studies and clinical trial results; and
- a reduction in the financial resources the collaborator can or is willing to apply to the development of new compounds.

Even if our collaborative partners continue their collaborative arrangements with us, they may nevertheless determine not to actively pursue the development or commercialization of any resulting products. Also, our collaborative partners may fail to perform their obligations under the collaborative agreements or may be slow in performing their obligations. Our collaborative partners can terminate our collaborative agreements under certain conditions. The decision to advance a product that is covered by a collaborative agreement through clinical trials and ultimately to commercialization is in the discretion of our collaborative partners. If any collaborative partner were to terminate or breach our agreements, fail to complete its obligations to us in a timely manner, or decide to discontinue its development of a product candidate, our anticipated revenue from the agreement and from the development and commercialization of the products would be severely limited. If we are not able to establish additional collaborations or any or all of our existing collaborations are terminated and we are not able to enter into alternative collaborations on acceptable terms, or at all, our continued development, manufacture and commercialization of our product candidates could be delayed or scaled back as we may not have the funds or capability to continue these activities. If our collaborators fail to successfully develop and commercialize TAP compounds, our business would be severely harmed.

We depend on a small number of collaborators for a substantial portion of our revenue. The loss of, or a material reduction in activity by, any one of these collaborators could result in a substantial decline in our revenue.

We have and will continue to have collaborations with a limited number of companies. As a result, our financial performance depends on the efforts and overall success of these

Table of Contents

companies. Also, the failure of any one of our collaborative partners to perform its obligations under its agreement with us, including making any royalty, milestone or other payments to us, could have an adverse effect on our financial condition. Further, any material reduction by any one of our collaborative partners in its level of commitment of resources, funding, personnel, and interest in continued development under its agreement with us could have an adverse effect on our financial condition. In July 2003, we entered into a discovery, development and commercialization collaboration with sanofi-aventis that entitled us to receive committed research funding. We recorded $81.5 million of committed research and development support revenue under this agreement. The committed funding portion of this agreement ended in October 2008 and there are no other agreements in place at this time that entitle us to committed research funding. As a result, we expect a reduction in our research and development revenue. To date, we have recorded $13.5 million in milestone payments with the advancement of T-DM1. Our agreement with Genentech, a wholly owned member of the Roche Group, entitles us to receive up to $44 million in potential milestone payments and also royalties on commercial sales, if any. Failure of Genentech and Roche to continue to advance T-DM1 would have an adverse effect on our financial outlook. Also, if consolidation trends in the healthcare industry continue, the number of our potential collaborators could decrease, which could have an adverse impact on our development efforts. If a present collaborator or future collaborator of ours were to be involved in a business combination, the collaborator's continued pursuit and emphasis on our product development program could be delayed, diminished or terminated.

If our collaborative partners' requirements for clinical materials to be manufactured by us are significantly lower than we have estimated, our financial results and condition could be adversely affected.

We procure certain components of finished conjugate, including ansamitocin P3, DM1, DM4, and linker, on behalf of our collaborators. In order to meet our commitments to our collaborative partners, we are required to enter into agreements with third parties to produce these components well in advance of our production of clinical materials on behalf of our collaborative partners. If our collaborative partners do not require as much clinical material as we have contracted to produce, we may not be able to recover our investment in these components and we may suffer significant losses. Collaborators have discontinued development of product candidates in the past and in the periods subsequent to these discontinuations, we had significantly reduced demand for conjugated material which adversely impacted our financial results.

In addition, we operate a conjugate manufacturing facility. A portion of the cost of operating this facility, including the cost of manufacturing personnel, is reimbursed by our collaborators based on the number of batches of preclinical and clinical materials produced on their behalf. If we produce fewer batches of clinical materials for our collaborators, a smaller amount of the cost of operating the conjugate manufacturing facility will be charged to our collaborative partners and our financial condition could be adversely affected.

Table of Contents

If our antibody requirements for clinical materials to be manufactured are significantly higher than we estimated, the inability to procure additional antibody in a timely manner could impair our ability to initiate or advance our clinical trials.

We rely on third-party suppliers to manufacture antibodies used in our own proprietary product candidates. Due to the specific nature of the antibody and availability of production capacity, there is significant lead time required by these suppliers to provide us with the needed materials. If our antibody requirements for clinical materials to be manufactured are significantly higher than we estimated, we may not be able to readily procure additional antibody which would impair our ability to advance our clinical trials currently in process or initiate additional trials. For example, enrollment of new patients into all clinical trials of lorvotuzumab mertansine was suspended in late 2006 due to insufficient supply of lorvotuzumab mertansine. We believe we have resolved these supply issues and that we have sufficient supply of lorvotuzumab mertansine to complete these trials on a timely basis. There can be no assurance that we will not have future supply problems that could delay or stop our clinical trials or otherwise could have a material adverse effect on our business.

We currently rely on one third-party manufacturer with commercial production experience to produce our cell-killing agents, DM1 and DM4.

We rely on third-party suppliers to manufacture materials used to make TAP compounds. Our cell-killing agents DM1 and DM4, collectively DMx, are manufactured from a precursor, ansamitocin P3. As part of preparing to produce TAP compounds for later-stage clinical trials and commercialization, we have transitioned from our original supplier of ansamitocin P3, as well as our single supplier that converts ansamitocin P3 to DMx, to one larger company with more commercial production experience. Any delay or interruption in our supply of DMx could lead to a delay or interruption in our manufacturing operations, preclinical studies and clinical trials of our product candidates and our collaborators' product candidates, which could negatively affect our business.

We may be unable to establish the manufacturing capabilities necessary to develop and commercialize our and our collaborative partners' potential products.

Currently, we have only one conjugate manufacturing facility that we use to manufacture conjugated compounds for us and our collaborative partners for preclinical studies and early-stage clinical testing. Two of our partners have contracted for separate large, scale manufacturing capacity to make materials to support potential future commercialization of their TAP compounds. We do not currently have the manufacturing capacity needed to make our product candidates for commercial sale. In addition, our manufacturing capacity may be insufficient to complete all clinical trials contemplated by us and our collaborative partners over time. We intend to rely in part on third-party contract manufacturers to produce sufficiently large quantities of drug materials that are and will be needed for later-stage clinical trials and commercialization of our potential products. We are currently in the process of developing relationships with third-party manufacturers that we believe will be necessary to continue the development of our product candidates. Third-party manufacturers may not be able to meet our needs with respect to timing, quantity or quality of materials. If we are unable to contract for a sufficient supply of needed materials on acceptable terms, or if we should encounter delays or difficulties in our relationships with manufacturers, our clinical trials may be delayed, thereby delaying the submission of product candidates for regulatory approval

Table of Contents

and the market introduction and subsequent commercialization of our potential products. Any such delays may lower our revenues and potential profitability.

In addition to the outsourcing of manufacturing, we may develop our manufacturing capacity in part by expanding our current facilities. This activity would require substantial additional funds and we would need to hire and train significant numbers of employees to staff these facilities. We may not be able to develop manufacturing facilities that are sufficient to produce drug materials for later-stage clinical trials or commercial use. We and any third-party manufacturers that we may use must continually adhere to current good manufacturing practice, or cGMP, regulations enforced by the FDA through its facilities inspection program. If our facilities or the facilities of third-party manufacturers cannot pass a pre-approval plant inspection, the FDA will not grant approval to our product candidates. In complying with these cGMP regulations and foreign regulatory requirements, we and any of our third-party manufacturers will be obligated to expend time, money and effort on production, record-keeping and quality control to assure that our potential products meet applicable specifications and other requirements. If we or any third-party manufacturer with whom we may contract fail to maintain regulatory compliance, we or the third party may be subject to fines and/or manufacturing operations may be suspended.

We have only one conjugate manufacturing facility and any prolonged and significant disruption at that facility could impair our ability to manufacture our and our collaborative partners' product candidates for clinical testing.

Currently, we are contractually obligated to manufacture Phase I and non-pivotal Phase II clinical products for companies licensing our TAP technology. We manufacture this material, as well as material for our own product candidates, in our conjugate manufacturing facility. We have only one such manufacturing facility in which we can manufacture clinical products. Our current manufacturing facility contains highly specialized equipment and utilizes complicated production processes developed over a number of years that would be difficult, time-consuming and costly to duplicate. Any prolonged disruption in the operations of our manufacturing facility would have a significant negative impact on our ability to manufacture products for clinical testing on our own and would cause us to seek additional third-party manufacturing contracts, thereby increasing our development costs. Even though we carry business interruption insurance policies, we may suffer losses as a result of business interruptions that exceed the coverage available or any losses may be excluded under our insurance policies. Certain events, such as natural disasters, fire, political disturbances, sabotage or business accidents, which could impact our current or future facilities, could have a significant negative impact on our operations by disrupting our product development efforts until such time as we are able to repair our facility or put in place third-party contract manufacturers to assume this manufacturing role.

Unfavorable pricing regulations, third-party reimbursement practices or healthcare reform initiatives applicable to our product candidates could limit our potential product revenue.

Antibody-based anticancer products are often much more costly to produce than traditional chemotherapeutics and tend to have significantly higher prices. Factors that help justify the price include the high mortality associated with many types of cancer and the need for more and better treatment options.

Table of Contents

Regulations governing drug pricing and reimbursement vary widely from country to country. Some countries require approval of the sales price of a drug before it can be marketed. Some countries restrict the physicians that can authorize the use of more expensive medications. Some countries establish treatment guidelines to help limit the use of more expensive therapeutics and the pool of patients that receive them. In some countries, including the United States, third-party payers frequently seek discounts from list prices and are increasingly challenging the prices charged for medical products. Because our product candidates are in the development stage, we do not know the level of reimbursement, if any, we will receive for any products that we are able to successfully develop. If the reimbursement for any of our product candidates is inadequate in light of our development and other costs, our ability to achieve profitability would be affected.

We believe that the efforts of governments and third-party payors to contain or reduce the cost of healthcare will continue to affect the business and financial condition of pharmaceutical and biopharmaceutical companies. A number of legislative and regulatory proposals to change the healthcare system in the United States and other major healthcare markets have been proposed and adopted in recent years. For example, the U.S. Congress enacted a limited prescription drug benefit for Medicare recipients as part of the Medicare Prescription Drug, Improvement and Modernization Act of 2003. While the program established by this statute may increase demand for any products that we are able to successfully develop, if we participate in this program, our prices will be negotiated with drug procurement organizations for Medicare beneficiaries and are likely to be lower than prices we might otherwise obtain. Non-Medicare third-party drug procurement organizations may also base the price they are willing to pay on the rate paid by drug procurement organizations for Medicare beneficiaries. Also, in March 2010, President Obama signed one of the most significant health care reform measures in decades, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act, collectively referred to herein as the PPACA. The PPACA will significantly impact the pharmaceutical industry. The PPACA will require discounts under the Medicare drug benefit program and increased rebates on drugs covered by Medicaid. In addition, the PPACA imposes an annual fee, which will increase annually, on sales by branded pharmaceutical manufacturers starting in 2011. The financial impact of these discounts, increased rebates and fees and the other provisions of the PPACA on our business is unclear and there can be no assurance that our business will not be materially adversely affected by the PPACA. In addition, these and other ongoing initiatives in the United States have increased and will continue to increase pressure on drug pricing. The announcement or adoption of any such initiative could have an adverse effect on potential revenues from any product candidate that we may successfully develop.

We may be unable to establish sales and marketing capabilities necessary to successfully commercialize our potential products.

We currently have no direct sales or marketing capabilities. We anticipate relying on third parties to market and sell most of our primary product candidates or we may outlicense these products prior to the time when these capabilities are needed. If we decide to market our potential products through a direct sales force, we would need either to hire a sales force with expertise in pharmaceutical sales or to contract with a third party to provide a sales force which meets our needs. We may be unable to establish marketing, sales and distribution capabilities necessary to commercialize and gain market acceptance for our potential products

Table of Contents

and be competitive. In addition, co-promotion or other marketing arrangements with third parties to commercialize potential products could significantly limit the revenues we derive from these potential products, and these third parties may fail to commercialize our compounds successfully.

If our product candidates or those of our collaborative partners do not gain market acceptance, our business will suffer.

Even if clinical trials demonstrate the safety and efficacy of our and our collaborative partners' product candidates and the necessary regulatory approvals are obtained, our and our collaborative partners' product candidates may not gain market acceptance among physicians, patients, healthcare payors and other members of the medical community. The degree of market acceptance of any product candidates that we or our collaborative partners develop will depend on a number of factors, including:

their degree of clinical efficacy and safety;

their advantage over alternative treatment methods;

our/the marketer's and our collaborative partners' ability to gain acceptable reimbursement and the reimbursement policies of government and third-party payors; and

the quality of the distribution capabilities for product candidates, both ours and our collaborative partners.

Physicians may not prescribe any of our future products until such time as clinical data or other factors demonstrate the safety and efficacy of those products as compared to conventional drug and other treatments. Even if the clinical safety and efficacy of therapies using our products is established, physicians may elect not to recommend the therapies for any number of other reasons, including whether the mode of administration of our products is effective for certain conditions, and whether the physicians are already using competing products that satisfy their treatment objectives. Physicians, patients, third-party payors and the medical community may not accept and use any product candidates that we, or our collaborative partners, develop. If our products do not achieve significant market acceptance and use, we will not be able to recover the significant investment we have made in developing such products and our business will be severely harmed.

We may be unable to compete successfully.

The markets in which we compete are well established and intensely competitive. We may be unable to compete successfully against our current and future competitors. Our failure to compete successfully may result in pricing reductions, reduced gross margins and failure to achieve market acceptance for our potential products. Our competitors include research institutions, pharmaceutical companies and biotechnology companies, such as Wyeth, Seattle Genetics, Inc. and Bristol-Myers Squibb Company. Many of these organizations have substantially more experience and more capital, research and development, regulatory, manufacturing, human and other resources than we do. As a result, they may:

develop products that are safer or more effective than our product candidates;

obtain FDA and other regulatory approvals or reach the market with their products more rapidly than we can, reducing the potential sales of our product candidates;

Table of Contents

devote greater resources to market or sell their products;

adapt more quickly to new technologies and scientific advances;

initiate or withstand substantial price competition more successfully than we can;

have greater success in recruiting skilled scientific workers from the limited pool of available talent;

more effectively negotiate third-party licensing and collaboration arrangements; and

take advantage of acquisition or other opportunities more readily than we can.

A number of pharmaceutical and biotechnology companies are currently developing products targeting the same types of cancer that we target, and some of our competitors' products have entered clinical trials or already are commercially available.

Our product candidates, if approved and commercialized, will also compete against well-established, existing, therapeutic products that are currently reimbursed by government healthcare programs, private health insurers and health maintenance organizations. In addition, if our product candidates are approved and commercialized, we may face competition from generic products if the product candidate is a small molecule drug, or biosimilars if the product candidate is a biologic. The route to market for generic versions of small molecule drugs was established with the passage of the Hatch-Waxman Amendments in 1984 and for biosimilars with the passage of the PPACA in March 2010. The PPACA establishes a pathway for the FDA approval of follow on biologics and provides twelve years exclusivity for reference products and an additional six months exclusivity period if pediatric studies are conducted. In Europe, the European Medicines Agency has issued guidelines for approving products through an abbreviated pathway, and biosimilars have been approved in Europe. If a biosimilar version of one of our potential products were approved in the United States or Europe, it could have a negative effect on sales of the potential product and our financial condition.

We face and will continue to face intense competition from other companies for collaborative arrangements with pharmaceutical and biotechnology companies, for relationships with academic and research institutions and for licenses to proprietary technology. In addition, we anticipate that we will face increased competition in the future as new companies enter our markets and as scientific developments surrounding antibody-based therapeutics for cancer continue to accelerate. While we will seek to expand our technological capabilities to remain competitive, research and development by others may render our technology or product candidates obsolete or noncompetitive or result in treatments or cures superior to any therapy developed by us.

If we are unable to protect our intellectual property rights adequately, the value of our technology and our product candidates could be diminished.

Our success depends in part on obtaining, maintaining and enforcing our patents and other proprietary rights and our ability to avoid infringing the proprietary rights of others. Patent law relating to the scope of claims in the biotechnology field in which we operate is still evolving, is surrounded by a great deal of uncertainty and involves complex legal, scientific and factual questions. To date, no consistent policy has emerged regarding the breadth of claims allowed in biotechnology patents. Accordingly, our pending patent applications may not result

Table of Contents

in issued patents. Although we own numerous patents, the issuance of a patent is not conclusive as to its validity or enforceability. Through litigation, a third party may challenge the validity or enforceability of a patent after its issuance.

Also, patents and applications owned or licensed by us may become the subject of interference, opposition, nullity, or other proceedings in a court or patent office in the United States or in a foreign jurisdiction to determine validity, enforceability or priority of invention, which could result in substantial cost to us. An adverse decision in such a proceeding may result in our loss of rights under a patent or patent application. It is unclear how much protection, if any, will be given to our patents if we attempt to enforce them or if they are challenged in court or in other proceedings. A competitor may successfully invalidate our patents or a challenge could result in limitations of the patents' coverage. In addition, the cost of litigation or interference proceedings to uphold the validity of patents can be substantial. If we are unsuccessful in these proceedings, third parties may be able to use our patented technology without paying us licensing fees or royalties. Moreover, competitors may infringe our patents or successfully avoid them through design innovation. To prevent infringement or unauthorized use, we may need to file infringement claims, which are expensive and time-consuming. In an infringement proceeding, a court may decide that a patent of ours is not valid. Even if the validity of our patents were upheld, a court may refuse to stop the other party from using the technology at issue on the ground that its activities are not covered by our patents.

In recent years, policymakers have also proposed reforming U.S. patent laws and regulations. For example, in March 2010, the Senate Judiciary Committee released the Patent Reform Act of 2010. Although it has not yet been approved by both houses, in general, the proposed legislation attempts to address issues surrounding the enforceability of patents and the increase in patent litigation by, among other things, changing the way damages for patent infringement are determined, moving to a first-inventor-to-file system, establishing new procedures for challenging patents and establishing different methods for invalidating patents. While we cannot predict what form any new patent reform laws or regulations ultimately may take, final legislation could introduce new substantive rules and procedures for challenging patents, and certain reforms that make it easier for competitors to challenge our patents could have a material adverse effect on our business and prospects.

Policing unauthorized use of our intellectual property is difficult, and we may not be able to prevent misappropriation of our proprietary rights, particularly in countries where the laws may not protect such rights as fully as in the United States.

In addition to our patent rights, we also rely on unpatented technology, trade secrets, know-how and confidential information. Third parties may independently develop substantially equivalent information and techniques or otherwise gain access to or disclose our technology. We may not be able to effectively protect our rights in unpatented technology, trade secrets, know-how and confidential information. We require each of our employees, consultants and corporate partners to execute a confidentiality agreement at the commencement of an employment, consulting or collaborative relationship with us. Further, we require that all employees enter into assignment of invention agreements as a condition of employment. However, these agreements may not provide effective protection of our information or, in the event of unauthorized use or disclosure, they may not provide adequate remedies.

Table of Contents

Any inability to license from third parties their proprietary technologies or processes which we use in connection with the development and manufacture of our product candidates may impair our business.

Other companies, universities and research institutions have or may obtain patents that could limit our ability to use, manufacture, market or sell our product candidates or impair our competitive position. As a result, we would have to obtain licenses from other parties before we could continue using, manufacturing, marketing or selling our potential products. Any necessary licenses may not be available on commercially acceptable terms, if at all. If we do not obtain required licenses, we may not be able to market our potential products at all or we may encounter significant delays in product development while we redesign products or methods that are found to infringe on the patents held by others.

We may incur substantial costs as a result of litigation or other proceedings relating to patent and other intellectual property rights held by third parties and we may be unable to protect our rights to, or to commercialize, our product candidates.

Patent litigation is very common in the biotechnology and pharmaceutical industries. Third parties may assert patent or other intellectual property infringement claims against us with respect to our technologies, products or other matters. From time to time, we have received correspondence from third parties alleging that we infringe their intellectual property rights. Any claims that might be brought against us alleging infringement of patents may cause us to incur significant expenses and, if successfully asserted against us, may cause us to pay substantial damages and limit our ability to use the intellectual property subject to these claims. Even if we were to prevail, any litigation would be costly and time-consuming and could divert the attention of our management and key personnel from our business operations. Furthermore, as a result of a patent infringement suit, we may be forced to stop or delay developing, manufacturing or selling potential products that incorporate the challenged intellectual property unless we enter into royalty or license agreements. There may be third-party patents, patent applications and other intellectual property relevant to our potential products that may block or compete with our products or processes. In addition, we sometimes undertake research and development with respect to potential products even when we are aware of third-party patents that may be relevant to our potential products, on the basis that such patents may be challenged or licensed by us. If our subsequent challenge to such patents were not to prevail, we may not be able to commercialize our potential products after having already incurred significant expenditures unless we are able to license the intellectual property on commercially reasonable terms. We may not be able to obtain royalty or license agreements on terms acceptable to us, if at all. Even if we were able to obtain licenses to such technology, some licenses may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. Ultimately, we may be unable to commercialize some of our potential products or may have to cease some of our business operations, which could severely harm our business.

We use hazardous materials in our business, and any claims relating to improper handling, storage or disposal of these materials could harm our business.

Our research and development and manufacturing activities involve the controlled use of hazardous materials, chemicals, biological materials and radioactive compounds. We are subject to federal, state and local laws and regulations governing the use, manufacture, storage, handling and disposal of these materials and certain waste products. Although we believe that

Table of Contents

our safety procedures for handling and disposing of these materials comply with the standards prescribed by applicable laws and regulations, we cannot completely eliminate the risk of accidental contamination or injury from these materials. In the event of such an accident, we could be held liable for any resulting damages, and any liability could exceed our resources. We may be required to incur significant costs to comply with these laws in the future. Failure to comply with these laws could result in fines and the revocation of permits, which could prevent us from conducting our business.

We face product liability risks and may not be able to obtain adequate insurance.

While we secure waivers from all participants in our clinical trials, the use of our product candidates during testing or after approval entails an inherent risk of adverse effects, which could expose us to product liability claims. Regardless of their merit or eventual outcome, product liability claims may result in:

decreased demand for our product;

injury to our reputation and significant negative media attention;

withdrawal of clinical trial volunteers;

costs of litigation;

distraction of management; and

substantial monetary awards to plaintiffs.

We may not have sufficient resources to satisfy any liability resulting from these claims. We currently have $5 million of product liability insurance for products which are in clinical testing. This coverage may not be adequate in scope to protect us in the event of a successful product liability claim. Further, we may not be able to maintain our current insurance or obtain general product liability insurance on reasonable terms and at an acceptable cost if we or our collaborative partners begin commercial production of our proposed product candidates. This insurance, even if we can obtain and maintain it, may not be sufficient to provide us with adequate coverage against potential liabilities.

We depend on our key personnel and we must continue to attract and retain key employees and consultants.

We depend on our key scientific and management personnel. Our ability to pursue the development of our current and future product candidates depends largely on retaining the services of our existing personnel and hiring additional qualified scientific personnel to perform research and development. We will also need to hire personnel with expertise in clinical testing, government regulation, manufacturing, marketing and finance. Attracting and retaining qualified personnel will be critical to our success. We may not be able to attract and retain personnel on acceptable terms given the competition for such personnel among biotechnology, pharmaceutical and healthcare companies, universities and non-profit research institutions. Failure to retain our existing key management and scientific personnel or to attract additional highly qualified personnel could delay the development of our product candidates and harm our business.

Our stock price can fluctuate significantly and results announced by us and our collaborators can cause our stock price to decline.

Our stock price can fluctuate significantly due to business developments announced by us and by our collaborators, as a result of market trends and as a result of our low stock price and

Table of Contents

daily trading volume. The business developments that could impact our stock price include disclosures related to clinical findings with compounds that make use of our TAP technology, new collaborations and clinical advancement or discontinuation of product candidates that make use of our TAP technology. Our stock price can also fluctuate significantly with the level of overall investment interest in small-cap biotechnology stocks.

Our operating results have fluctuated in the past and are likely to continue to do so in the future. Our revenue is unpredictable and may fluctuate due to the timing of non-recurring licensing fees, decisions of our collaborative partners with respect to our agreements with them, reimbursement for manufacturing services, the achievement of milestones and our receipt of the related milestone payments under new and existing licensing and collaboration agreements. Revenue historically recognized under our prior collaboration agreements may not be an indicator of revenue from any future collaborations. In addition, our expenses are unpredictable and may fluctuate from quarter to quarter due to the timing of expenses, which may include obligations to manufacture or supply product or payments owed by us under licensing or collaboration agreements. It is possible that our quarterly and/or annual operating results will not meet the expectations of securities analysts or investors, causing the market price of our common stock to decline. We believe that quarter-to-quarter and year-to-year comparisons of our operating results are not good indicators of our future performance and should not be relied upon to predict the future performance of our stock price.

We do not intend to pay cash dividends on our common stock.

We have not paid cash dividends since our inception and do not intend to pay cash dividends in the foreseeable future. Therefore, shareholders will have to rely on appreciation in our stock price, if any, in order to achieve a gain on an investment

Risks related to this offering

We may allocate the net proceeds from this offering in ways that you and other shareholders may not approve.

We intend to use the net proceeds from this offering for general corporate purposes, which may include:

- research and development expenditures;
- clinical trial expenditures;
- manufacture of the components of product candidates in development and of the product candidates themselves;
- acquisitions of new technologies;
- capital expenditures;
- investments; and
- working capital.

Our management will have broad discretion as to the application of these net proceeds and could use them for purposes other than those contemplated at the time of this offering. Our stockholders may not agree with the manner in which our management chooses to allocate

Table of Contents

and spend the net proceeds and our management could spend the net proceeds in ways that do not necessarily improve our operating results or enhance the value of our common stock.

You will experience immediate dilution in the book value per share of the common stock you purchase.

Because the price per share of our common stock being offered is substantially higher than the book value per share of our common stock, you will suffer substantial dilution in the net tangible book value of the common stock you purchase in this offering. After giving effect to the sale by us of 8,500,000 shares of common stock in this offering, and based on an assumed public offering price of $10.25 per share in this offering and a net tangible book value per share of our common stock of $0.63 as of March 31, 2010, if you purchase shares of common stock in this offering, you will suffer immediate and substantial dilution of $8.46 per share in the as adjusted net tangible book value of our common stock. If the underwriters exercise their over-allotment options you will experience additional dilution. See "Dilution" on page S-30 for a more detailed discussion of the dilution you will incur in connection with this offering.

Table of Contents

Special note regarding forward-looking statement

This prospectus supplement, the accompanying prospectus and the documents incorporated by reference herein and therein contain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. These statements relate to future events and our future financial performance.

These forward-looking statements are identified by their use of terms and phrases, such as "anticipate," "believe," "could," "estimate," "expect," "intend," "may," "plan," "predict," "project," "will" and other similar terms and phrases, including references to assumptions. These statements are contained in the "Risk Factors" section, as well as other sections of this prospectus supplement.

Forward-looking statements in this prospectus supplement include, but are not limited to:

- our and our collaborators' expectations regarding clinical trials, development timelines and regulatory filings for T-DM1, lorvotuzumab mertansine, SAR3419, IMGN388 and other drug candidates under development by us and our collaborators;

- Roche's plan to submit a marketing application to the FDA for T-DM1 for the treatment of third-line and later HER2+ MBC in the United States in 2010 on the basis of the Phase II study of T-DM1 as a third-line treatment in HER2+ MBC that was presented at the San Antonio Breast Cancer Symposium in December 2009;

- our belief that Roche could receive marketing approval of T-DM1 in the United States in late 2010 or early 2011 assuming Roche submits its application in 2010;

- Roche's expectation that it expects interim data from a Phase Ib/II clinical trial assessing T-DM1 plus pertuzumab to be reported at ASCO in June 2010 and that it expects preliminary data from a Phase II clinical trial comparing T-DM1, as a single agent, against trastuzumab plus docetaxel for first-line treatment of HER2+ MBC to be reported at the ESMO meeting in October 2010;

- Roche's expectation to start a Phase III clinical trial to assess T-DM1 as a first-line treatment for HER2+ MBC in the second half of 2010;

- the expectation that Roche could file a marketing application for T-DM1 as second-line treatment in HER2+ MBC with the FDA and in the European Union during 2012 and as a first-line treatment with the FDA after 2013, that Roche will provide information related to the EMILIA trial during 2010, that additional clinical data with T-DM1, used alone or in combination, will be reported at SABCS in December 2010, and that peak T-DM1 sales could be between 2 and 5 billion Swiss francs annually;

- our belief that T-DM1 has the potential to be a valuable new pharmaceutical for the treatment of patients with HER2+ MBC and that lorvotuzumab mertansine has the potential to be the first effective antibody-based therapy for certain targeted cancers;

- our expectation as to the number of cases of small-cell lung cancer, ovarian cancer, multiple myeloma and Merkel cell carcinoma that will be diagnosed in the United States in 2010;

Table of Contents

our plan to use data from the ongoing clinical trial of lorvotuzumab mertansine, together with input gained from regulatory agencies, to make a decision in late 2010 as to whether to commence a pivotal Phase II clinical trial of lorvotuzumab mertansine for the treatment of Merkel cell carcinoma in 2011 and our expectations as to the design of this trial;

our plan to start a Phase I/II clinical trial by late 2010 to evaluate lorvotuzumab mertansine in combination with etoposide/carboplatin, the standard care, for first-line treatment of small-cell lung cancer;

our expectation to report interim data from one or more of our clinical trials of lorvotuzumab mertansine at the ESMO annual meeting in October 2010 and/or the ASH annual meeting in December 2010;

sanofi-aventis' expectation to report certain Phase I data for SAR3419 at the ASH annual meeting in December 2010 and to advance SAR3419 into Phase II clinical testing in the second half of 2010;

our expectation that IMGN388 Phase I data will be reported at ASCO in June 2010 and to submit an IND application to the FDA for IMGN529 in 2011;

our expectation that two compounds will advance into clinical testing in 2010 through our collaboration with sanofi-aventis;

our expectation that our TAP technology potentially may be used with antibodies with limited or no anticancer activity of their own, enabling effective antibody-based therapies to be developed for many more types of cancers and that over the next several years we will be involved in numerous clinical trials for existing and new product candidates focused on various stages of development ranging from early stage to registration trials;

our belief that our current working capital, not including the net proceeds of this offering, and future payments, if any, from our collaboration arrangements will be sufficient to meet our current and projected operating and capital requirements for the remainder of fiscal year 2010 and for fiscal year 2011;

our expectation of the amount and timing of future revenues, potential development, clinical and regulatory milestones, expenses, investments and other items affecting the results of our operations; and

our expected uses of the net proceeds of this offering.

These forward-looking statements involve known and unknown risks, uncertainties and other factors that may cause actual results to be materially different from those contemplated by our forward-looking statements. These known and unknown risks, uncertainties and other factors are described in detail in the "Risk Factors" section and in other sections of this prospectus supplement and our Annual Report on Form 10-K for the fiscal year ended June 30, 2009 and our subsequent Quarterly Reports on Form 10-Q. We disclaim any intention or obligation to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise.

Table of Contents

Use of proceeds

We estimate that the net proceeds we will receive from this offering, based on an assumed public offering price of $10.25 per share, will be approximately $82.1 million, after deducting the estimated underwriting discounts and estimated offering expenses payable by us or approximately $94.4 million if the underwriters exercise their over-allotment option in full.

Each $1.00 increase (decrease) in the assumed public offering price of $10.25 per share would increase (decrease) the net proceeds received by us from this offering by approximately $8.0 million, assuming the number of shares offered by us, as set forth on the cover page of this prospectus supplement, remains the same. We may also increase or decrease the number of shares we are offering. Each increase (decrease) of 1,000,000 shares in the number of shares offered by us would increase (decrease) the net proceeds received by us from this offering by approximately $9.7 million, assuming that the assumed public offering price remains the same, and after deducting the estimated underwriting discounts and estimated offering expenses payable by us. We do not expect that a change in the offering price or the number of shares by these amounts would have a material effect on our uses of the proceeds from this offering.

We intend to use the net proceeds from this offering for general corporate purposes, which may include research and development expenditures, clinical trial expenditures, manufacture and supply of drug substance and drug products, acquisitions of new technologies, capital expenditures and working capital.

We have not determined the amounts we plan to spend on any of the areas listed above or the timing of these expenditures. As a result, our management will have broad discretion to allocate the net proceeds from this offering. We have no current plans, commitments or agreements with respect to any acquisitions and may not make any acquisitions. Pending application of the net proceeds as described above, we intend to invest the net proceeds of the offering in short-term, investment-grade, interest-bearing securities.

Table of Contents

Dilution

If you purchase our common stock in this offering, your interest will be diluted to the extent of the difference between the public offering price per share and the net tangible book value per share of our common stock after this offering. We calculate net tangible book value per share by subtracting our total liabilities from our total tangible assets and dividing the difference by the number of outstanding shares of our common stock. Total tangible assets excludes deferred debt costs included in other assets on our condensed consolidated balance sheets at March 31, 2010.

Our net tangible book value at March 31, 2010 was $36.0 million, or $0.63 per share, based on 57.4 million shares of our common stock outstanding. After giving effect to the sale of 8,500,000 shares of common stock by us at a assumed public offering price of $10.25 per share, less the estimated underwriting discounts and estimated offering expenses payable by us, our as adjusted net tangible book value at March 31, 2010 would be $118.0 million, or $1.79 per share. This represents an immediate increase in the as adjusted net tangible book value of $1.16 per share to existing stockholders and an immediate dilution of $8.46 per share to investors in this offering. The following table illustrates this per share dilution:

Assumed public offering price per share		$ 10.25
Net tangible book value per share as of March 31, 2010	$ 0.63	
Increase per share attributable to this offering	$ 1.16	
As adjusted net tangible book value per share after this offering		$ 1.79
Dilution per share to new investors		$ 8.46

A $1.00 increase in the assumed public offering price per share of $10.25 per share would increase our as adjusted net tangible book value after this offering to $126.1 million, or $1.91 per share, representing an immediate increase in the as adjusted net tangible book value of $1.28 per share to existing stockholders and an immediate dilution of $9.34 per share to investors in this offering, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus supplement, remains the same and after deducting the estimated underwriting discount and estimated offering expenses payable by us. A $1.00 decrease in the assumed public offering price per share of $10.25 per share would increase our as adjusted net tangible book value after this offering to $110.0 million, or $1.67 per share, representing an immediate increase in the as adjusted net tangible book value of $1.04 per share to existing stockholders and an immediate dilution of $7.58 per share to investors in this offering, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus supplement, remains the same and after deducting the estimated underwriting discount and estimated offering expenses payable by us. We may also increase or decrease the number of shares we are offering. An increase of 1,000,000 shares in the number of shares offered by us would increase our as adjusted net tangible book value after this offering to $127.7 million, or $1.91 per share, representing an immediate increase in as adjusted net tangible book value of $1.28 per share to existing stockholders and an immediate dilution of $8.34 per share to investors in this offering, assuming that the assumed public offering price remains the same, and after deducting the estimated underwriting discounts and estimated offering expenses payable by us. Similarly, a decrease of 1,000,000 shares in the number of shares offered by us would decrease our as adjusted net tangible book value after this offering to $108.3 million, or $1.67 per share, representing an immediate increase in as adjusted net

Table of Contents

tangible book value of $1.04 per share to existing stockholders and an immediate dilution of $8.58 per share to investors in this offering, assuming that the assumed public offering price remains the same, and after deducting the estimated underwriting discounts and estimated offering expenses payable by us. The information discussed above is illustrative only and will adjust based on the actual public offering price per share, the actual number of shares offered and other terms of this offering determined at pricing.

If the underwriters exercise their over-allotment option in full, the as adjusted net tangible book value would increase to approximately $130.4 million, or $1.94 per share, representing an increase to existing stockholders of approximately $1.31 per share, and there would be an immediate dilution of approximately $8.31 per share to new investors.

Table of Contents

Price range of common stock

Our common stock is listed on the Nasdaq Global Market under the symbol "IMGN." The last reported sale price for our common stock on May 4, 2010 was $10.25 per share. The table below sets forth closing information on the range of high and low closing prices for our common stock during the periods indicated.

	High	Low
Fiscal Year ended June 30, 2008		
First Quarter	$ 5.72	$ 4.29
Second Quarter	5.43	3.97
Third Quarter	4.18	2.73
Fourth Quarter	4.73	3.01
Fiscal Year ended June 30, 2009		
First Quarter	$ 5.80	$ 2.95
Second Quarter	4.89	2.47
Third Quarter	7.19	3.85
Fourth Quarter	8.83	6.49
Fiscal Year ended June 30, 2010		
First Quarter	$ 9.88	$ 7.14
Second Quarter	8.89	6.69
Third Quarter	8.27	6.35
Fourth Quarter (through May 4, 2010)	10.46	8.04

Dividend policy

We have never declared or paid any cash dividends on our common stock, and we currently expect that future earnings, if any, will be retained for use in our business. Accordingly, we do not expect to pay cash dividends on our common stock in the foreseeable future.

Table of Contents

Underwriting

We are offering the shares of common stock described in this prospectus supplement through a number of underwriters. J.P. Morgan Securities Inc. is acting as sole book-running manager of the offering and as representative of the underwriters. Subject to the terms and conditions of the underwriting agreement, we have agreed to sell to the underwriters, and each underwriter has severally agreed to purchase, at the public offering price less the underwriting discounts set forth on the cover page of this prospectus supplement, the number of shares of common stock listed next to its name in the following table:

Underwriters	Number of shares
J.P. Morgan Securities Inc.	
Total	

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

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

The underwriters have an option to buy up to 1,275,000 additional shares of common stock from us to cover sales of shares by the underwriters which exceed the number of shares specified in the table above. The underwriters have up to 30 days from the date of this prospectus supplement to exercise this over-allotment option. If any shares are purchased with this over-allotment option, the underwriters will purchase shares in approximately the same proportion as shown in the table above. If any additional shares of common stock are purchased, the underwriters will offer the additional shares on the same terms as those on which the shares are being offered.

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

	Without over-allotment exercise	With full over-allotment exercise
Per share	$	$
Total	$	$

We estimate that the total expenses of this offering, including registration, filing and listing fees, printing fees and legal and accounting expenses, but excluding underwriting discounts, will be approximately $260,000.

Table of Contents

We have agreed that we will not (i) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase or otherwise transfer or dispose of, directly or indirectly, or file with the Securities Exchange Commission a registration statement under the Securities Act of 1933 relating to, any shares of our common stock or any securities convertible into or exercisable or exchangeable for shares of our common stock, or publicly disclose the intention to make any offer, sale, pledge, disposition or filing or (ii) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of the common stock, whether any such transaction described in clauses (i) and (ii) above is to be settled by delivery of common stock or such other securities, in cash or otherwise, without the prior written consent of J.P. Morgan Securities Inc. for a period of 90 days after the date of this prospectus supplement. The foregoing restrictions do not apply to certain transactions, including:

- the sale of shares of common stock to the underwriters;
- any shares of our common stock issued upon the exercise of options granted under our existing stock option plans; and
- subject to certain exceptions, securities sold to collaborators, vendors, manufacturers, distributors, customers or other similar parties pursuant to a collaboration, licensing arrangement, strategic alliance, manufacturing or distribution arrangement or similar transaction, so long as recipients of such securities agree to be bound for any remaining portion of such 90-day restricted period on the above terms.

In addition, our directors and executive officers have entered into lock up agreements with the underwriters prior to the commencement of this offering pursuant to which these persons, with limited exceptions, for a period of 90 days after the date of this prospectus supplement, may not, without the prior written consent of J.P. Morgan Securities Inc., (i) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, or otherwise transfer or dispose of, directly or indirectly, any shares of our common stock or any securities convertible into or exercisable or exchangeable for shares of our common stock, or publicly disclose the intention to make any offer, sale, pledge, disposition or filing (including, without limitation, common stock which may be deemed to be beneficially owned by such directors and executive officers in accordance with the rules and regulations of the Securities and Exchange Commission and securities which may be issued upon exercise of a stock option or warrant), (ii) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of the common stock, or (iii) make any demand for or exercise any right with respect to the registration of any shares of common stock or any security convertible into or exercisable or exchangeable for common stock, whether any such transaction described in clauses (i) and (ii) above is to be settled by delivery of common stock or such other securities, in cash or otherwise.

The foregoing restrictions will not apply to transfers of our common stock by our directors and executive officers:

- as a bona fide gift or gifts;

Table of Contents

during the director's or officer's lifetime or upon death by will or intestacy to such director's or officer's immediate family or to a trust, the beneficiaries of which are the director or officer or members of his or her immediate family; and

distributions to members or stockholders of the director or officer;

provided, in each case, that the donee or transferee enter into a similar lock-up agreement.

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

Our common stock is listed on the NASDAQ Global Market under the symbol "IMGN".

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

The underwriters have advised us that, pursuant to Regulation M of the Securities Act of 1933, they may also engage in other activities that stabilize, maintain or otherwise affect the price of the common stock, including the imposition of penalty bids. This means that if the representative of the underwriters purchases common stock in the open market in stabilizing transactions or to cover short sales, the representative can require the underwriters that sold those shares as part of this offering to repay the underwriting discount received by them. These activities may have the effect of raising or maintaining the market price of the common stock or preventing or retarding a decline in the market price of the common stock, and, as a result, the price of the common stock may be higher than the price that otherwise might exist in the open market. If the underwriters commence these activities, they may discontinue them at any time. The underwriters may carry out these transactions on the NASDAQ Global Market, in the over-the-counter market or otherwise.

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

Table of Contents

allocated by the representatives to underwriters and selling group members that may make Internet distributions on the same basis as other allocations.

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

Selling Restrictions

European Economic area

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

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

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

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

in any other circumstances which do not require the publication by the Issuer of a prospectus pursuant to Article 3 of the Prospectus Directive.

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

Table of Contents

United Kingdom

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

Switzerland

This document does not constitute a prospectus within the meaning of Art. 652a of the Swiss Code of Obligations. Our shares of common stock may not be sold directly or indirectly in or into Switzerland except in a manner which will not result in a public offering within the meaning of the Swiss Code of Obligations. Neither this document nor any other offering materials relating to our shares of common stock may be distributed, published or otherwise made available in Switzerland except in a manner which will not constitute a public offer of our shares of common stock in Switzerland.

Legal matters

The validity of the shares of common stock offered hereby will be passed upon for us by Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts. Latham & Watkins LLP, Costa Mesa, California will act as counsel to the underwriter.

Experts

The consolidated financial statements of ImmunoGen, Inc. appearing in ImmunoGen, Inc.'s Annual Report (Form 10-K) for the year ended June 30, 2009, and the effectiveness of ImmunoGen, Inc.'s internal control over financial reporting as of June 30, 2009 have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their reports thereon, included therein, and incorporated herein by reference. Such consolidated financial statements are incorporated herein by reference in reliance upon such reports given on the authority of such firm as experts in accounting and auditing.

Where you can find more information

We are subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, and file annual, quarterly and current reports, proxy statements and other information with the SEC. You may read and copy these reports, proxy statements and other information at the SEC's public reference facilities at 100 F Street, N.E., Room 1580, Washington, D.C. 20549. You can request copies of these documents by writing to the SEC and paying a fee for the copying cost. Please call the SEC at 1-800-SEC-0330 for more information about the operation of the public reference facilities. SEC filings are also available at the SEC's web site at *http://www.sec.gov*.

Table of Contents

This prospectus supplement and the accompanying prospectus are only part of a registration statement on Form S-3 that we have filed with the SEC under the Securities Act of 1933, as amended, and therefore omits certain information contained in the registration statement. We have also filed exhibits and schedules with the registration statement that are excluded from this prospectus supplement, and you should refer to the applicable exhibit or schedule for a complete description of any statement referring to any contract or other document. You may inspect a copy of the registration statement, including the exhibits and schedules, without charge, at the public reference room or obtain a copy from the SEC upon payment of the fees prescribed by the SEC.

We also maintain a web site at *www.immunogen.com*, through which you can access our SEC filings. The information set forth on our web site is not part of this prospectus supplement.

Table of Contents

Incorporation of documents by reference

The SEC allows us to "incorporate by reference" information from other documents that we file with them, which means that we can disclose important information in this prospectus supplement by referring to those documents. The information incorporated by reference is considered to be part of this prospectus supplement, and information that we file later with the SEC will automatically update and supersede the information in this prospectus supplement. We incorporate by reference the following documents (unless otherwise noted, the SEC file number for each of the documents listed below is 000-17999):

- our Annual Report on Form 10-K, for the fiscal year ended June 30, 2009, filed with the SEC on August 28, 2009;
- our Quarterly Report on Form 10-Q, for the quarterly period ended September 30, 2009, filed with the SEC on November 4, 2009;
- our Quarterly Report on Form 10-Q, for the quarterly period ended December 31, 2009, filed with the SEC on January 29, 2010;
- our Quarterly Report on Form 10-Q, for the quarterly period ended March 31, 2010, filed with the SEC on April 30, 2010;
- the portions of our Definitive Proxy Statement on Schedule 14A that are deemed "filed" with the SEC under the Securities Exchange Act of 1934, as amended, filed on September 30, 2009;
- the description of our capital stock contained in our registration statement on Form 8-A, filed on September 25, 1989, as amended by Amendment No. 1 thereto, filed on November 15, 1989, under the Securities Exchange Act of 1934, as amended, including amendments or reports filed for the purpose of updating such description; and
- all reports and other documents subsequently filed by us pursuant to Sections 13(a), 13(c), 14 and 15(d) of the Securities Exchange Act of 1934, as amended, after the date of this prospectus supplement and prior to the termination of this offering shall be deemed to be incorporated by reference in this prospectus supplement and to be a part hereof from the date of filing such reports and other documents.

We will provide without charge to each person, including any beneficial owner, to whom a copy of this prospectus supplement is delivered, upon the request of any such person, a copy of any or all of the information incorporated herein by reference (exclusive of exhibits to such documents unless such exhibits are specifically incorporated by reference herein). Requests, whether written or oral, for such copies should be directed to ImmunoGen, Inc., Attention: Investor Relations, 830 Winter Street, Waltham, Massachusetts 02451, (781) 895-0600.

Table of Contents

Filed Pursuant to Rule 424(b)(2)
Registration No. 333-165981

PROSPECTUS

$125,000,000
COMMON STOCK
PREFERRED STOCK
DEBT SECURITIES
WARRANTS
UNITS

This prospectus will allow us to issue, from time to time at prices and on terms to be determined at or prior to the time of the offering, up to $125,000,000 of any combination of the securities described in this prospectus, either individually or in units. We may also offer common stock or preferred stock upon conversion of the debt securities, common stock upon conversion of the preferred stock, or common stock, preferred stock or debt securities upon the exercise of warrants. We will provide you with specific terms of any offering in one or more supplements to this prospectus. You should read this prospectus and any prospectus supplement, as well as any documents incorporated by reference into this prospectus or any prospectus supplement, carefully before you invest.

Our common stock is listed on The Nasdaq Global Market under the symbol "IMGN." On April 21, 2010, the last reported sale price of our common stock was $9.73 per share. The applicable prospectus supplement will contain information, where applicable, as to any other listing, if any, on The Nasdaq Global Market or any securities market or other securities exchange of the securities covered by the applicable prospectus supplement. Prospective purchasers of our securities are urged to obtain current information as to the market prices of our securities, where applicable.

Investing in our securities involves a high degree of risk. Before deciding whether to invest in our securities, you should consider carefully the risks that we have described on page 5 of this prospectus under the caption "Risk Factors." We may include specific risk factors in supplements to this prospectus under the caption "Risk Factors." This prospectus may not be used to offer or sell our securities unless accompanied by a prospectus supplement.

Our securities may be sold directly by us to investors, through agents designated from time to time or to or through underwriters or dealers. For additional information on the methods of sale, you should refer to the section entitled "Plan of Distribution" in this prospectus. If any underwriters are involved in the sale of our securities with respect to which this prospectus is being delivered, the names of such underwriters and any applicable commissions or discounts and over-allotment options will be set forth in a prospectus supplement. The price to the public of such securities and the net proceeds that we expect to receive from such sale will also be set forth in a prospectus supplement.

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

The date of this prospectus is April 22, 2010.

Table of Contents

TABLE OF CONTENTS

Table of Contents

ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement that we filed with the Securities and Exchange Commission, or SEC, utilizing a "shelf" registration process. Under this shelf registration process, we may offer shares of our common stock and preferred stock, various series of debt securities and/or warrants to purchase any of such securities, either individually or in units, in one or more offerings, with a total value of up to $125,000,000. This prospectus provides you with a general description of the securities we may offer. Each time we offer a type or series of securities under this prospectus, we will provide a prospectus supplement that will contain specific information about the terms of that offering.

This prospectus does not contain all of the information included in the registration statement. For a more complete understanding of the offering of the securities, you should refer to the registration statement, including its exhibits. The prospectus supplement may also add, update or change information contained or incorporated by reference in this prospectus. However, no prospectus supplement will offer a security that is not registered and described in this prospectus at the time of its effectiveness. This prospectus, together with the applicable prospectus supplements and the documents incorporated by reference into this prospectus, includes all material information relating to this offering. You should carefully read this prospectus, the applicable prospectus supplements, the information and documents incorporated herein by reference and the additional information under the heading "Where You Can Find More Information" before making an investment decision.

You should rely only on the information we have provided or incorporated by reference in this prospectus or any prospectus supplement. We have not authorized anyone to provide you with information different from that contained or incorporated by reference in this prospectus. No dealer, salesperson or other person is authorized to give any information or to represent anything not contained or incorporated by reference in this prospectus. You must not rely on any unauthorized information or representation. This prospectus is an offer to sell only the securities offered hereby, but only under circumstances and in jurisdictions where it is lawful to do so. You should assume that the information in this prospectus or any prospectus supplement is accurate only as of the date on the front of the document and that any information we have incorporated herein by reference is accurate only as of the date of the document incorporated by reference, regardless of the time of delivery of this prospectus or any sale of a security.

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

This prospectus may not be used to consummate sales of our securities, unless it is accompanied by a prospectus supplement. To the extent there are inconsistencies between any prospectus supplement, this prospectus and any documents incorporated by reference, the document with the most recent date will control.

Unless the context otherwise requires, "ImmunoGen," "the Company," "we," "us," "our" and similar names refer to ImmunoGen, Inc. and our subsidiaries.

Table of Contents

PROSPECTUS SUMMARY

The following is a summary of what we believe to be the most important aspects of our business and the offering of our securities under this prospectus. We urge you to read this entire prospectus, including the more detailed consolidated financial statements, notes to the consolidated financial statements and other information incorporated by reference from our other filings with the SEC or included in any applicable prospectus supplements. Investing in our securities involves risks. Therefore, carefully consider the risk factors in any prospectus supplements and in our most recent annual and quarterly filings with the SEC, as well as other information in this prospectus and any prospectus supplements and the documents incorporated by reference herein or therein, before purchasing our securities. Each of the risk factors could adversely affect our business, operating results and financial condition, as well as adversely affect the value of an investment in our securities.

About ImmunoGen, Inc.

Since our inception, we have been principally engaged in the development of novel, targeted therapeutics for the treatment of cancer using our expertise in cancer biology, manufactured antibodies and small-molecule cytotoxic, or cell-killing, agents. Our Targeted Antibody Payload, or TAP, technology uses antibodies to deliver a potent cytotoxic agent specifically to cancer cells to minimize damage to healthy tissue. A TAP compound consists of a tumor-targeting manufactured antibody with one of our proprietary cell-killing agents attached using one of our engineered linkers. The antibody component enables a TAP compound to bind specifically to cancer cells that express a particular target antigen, the highly potent cytotoxic agent serves to kill the cancer cell, and the engineered linker controls the release of the cytotoxic agent inside the cancer cell. We use our expertise and proprietary technologies to develop targeted anticancer compounds for our own product pipeline. We also establish partnerships with other companies around our TAP technology and antibody expertise.

The most advanced TAP compound is T-DM1, which is also known as trastuzumab-DM1. T-DM1 is in advanced clinical testing for the treatment of HER2+ metastatic breast cancer through our collaboration with Genentech, Inc., a wholly owned member of the Roche Group, which licensed the exclusive right to use certain of our cell-killing agents with antibodies that target HER2. Three other TAP compounds SAR3419, BT-062, BIIB015 are in early clinical testing through our collaborations with sanofi-aventis, Biotest AG and Biogen Idec Inc., respectively.

Our lead wholly owned drug candidate is lorvotuzumab mertansine, or IMGN901, which is a TAP compound in early clinical testing for the treatment of CD-56-expressing cancers, including small-cell lung cancer, Merkel cell carcinoma, ovarian cancer and multiple myeloma. Our earlier-stage drug candidate, IMGN388, is a TAP compound in initial clinical testing for the treatment of any array of solid tumors. We have a number of targeted, antibody-based compounds in our research pipeline.

We were organized as a Massachusetts corporation in March 1981. Our principal offices are located at 830 Winter Street, Waltham, MA 02451, and our telephone number is (781) 895-0600. We maintain a web site at www.immunogen.com, where certain information about us is available. Please note that the information contained on the website is not a part of this document.

Our annual reports on Form 10-K, quarterly reports on Form 10-Q and current reports on Form 8-K and all amendments to such reports are made available free of charge through the "Investor Information" section of our website as soon as reasonably practicable after they have been filed or furnished with the SEC. We have adopted a Code of Corporate Conduct that applies to all our directors, officers and employees and a Code of Ethics that applies to our senior officers and financial personnel. Our Code of Corporate Conduct and Senior Officer and Financial Personnel Code of Ethics are available free of charge through the "Investor Information" section of our website.

Table of Contents

Offerings Under This Prospectus

Under this prospectus, we may offer shares of our common stock and preferred stock, various series of debt securities and/or warrants to purchase any of such securities, either individually or in units, with a total value of up to $125,000,000, from time to time at prices and on terms to be determined by market conditions at the time of offering. This prospectus provides you with a general description of the securities we may offer. Each time we offer a type or series of securities under this prospectus, we will provide a prospectus supplement that will describe the specific amounts, prices and other important terms of the securities, including, to the extent applicable:

- designation or classification;
- aggregate principal amount or aggregate offering price;
- maturity, if applicable;
- rates and times of payment of interest or dividends, if any;
- redemption, conversion or sinking fund terms, if any;
- voting or other rights, if any;
- conversion prices, if any; and
- important United States federal income tax considerations.

The prospectus supplement also may add, update or change information contained in this prospectus or in documents we have incorporated by reference into this prospectus. However, no prospectus supplement will fundamentally change the terms that are set forth in this prospectus or offer a security that is not registered and described in this prospectus at the time of its effectiveness.

This prospectus may not be used to consummate a sale of any securities unless it is accompanied by a prospectus supplement.

We may sell the securities directly to investors or to or through agents, underwriters or dealers. We, and our agents or underwriters, reserve the right to accept or reject all or part of any proposed purchase of securities. If we offer securities through agents or underwriters, we will include in the applicable prospectus supplement:

- the names of those agents or underwriters;
- applicable fees, discounts and commissions to be paid to them;
- details regarding over-allotment options, if any; and
- the net proceeds to us.

Common Stock

We may issue shares of our common stock from time to time. The holders of common stock are entitled to one vote per share on all matters to be voted upon by shareholders. Subject to preferences that may be applicable to any outstanding preferred stock, the holders of common stock are entitled to receive ratably any dividends that may be declared from time to time by our board of directors out of funds legally available for that purpose. In the event of our liquidation, dissolution or winding up, the holders of common stock are entitled to share ratably in all assets remaining after payment of liabilities, subject to prior distribution rights of preferred stock then outstanding.

Table of Contents

Preferred Stock

We may issue shares of our preferred stock from time to time, in one or more series. Our board of directors may determine the rights, preferences, privileges and restrictions of the preferred stock, including dividend rights, conversion rights, preemptive rights, voting rights, terms of redemption, liquidation preferences, sinking fund terms and the number of shares constituting any series or the designation of any series. Convertible preferred stock will be convertible into our common stock. Conversion may be mandatory or at your option and would be at prescribed conversion rates.

If we sell any series of preferred stock under this prospectus and applicable prospectus supplements, we will fix the rights, preferences, privileges, qualifications and restrictions of the preferred stock of such series in the certificate of amendment to our certificate of incorporation or the certificate of designation relating to that series. We will file as an exhibit to the registration statement of which this prospectus is a part, or will incorporate by reference from a current report on Form 8-K that we file with the SEC, the form of any certificate that describes the terms of the series of preferred stock we are offering before the issuance of the related series of preferred stock. We urge you to read the prospectus supplements related to the series of preferred stock being offered, as well as the complete certificate that contains the terms of the applicable series of preferred stock.

Debt Securities

We may offer debt securities from time to time, in one or more series, as either senior or subordinated debt or as senior or subordinated convertible debt. The senior debt securities will rank equally with any other unsecured and unsubordinated debt. The subordinated debt securities will be subordinate and junior in priority of payment to certain of our other indebtedness to the extent described in a prospectus supplement. Convertible debt securities will be convertible into or exchangeable for our common stock or our other securities. Conversion may be mandatory or at your option and would be at prescribed conversion rates.

The debt securities will be issued under one or more documents called indentures, which are contracts between us and a national banking association or other eligible party, as trustee. In this prospectus, we have summarized certain general features of the debt securities. We urge you, however, to read the prospectus supplements related to the series of debt securities being offered, as well as the complete indentures that contain the terms of the debt securities. Forms of indentures have been filed as exhibits to the registration statement of which this prospectus is a part, and supplemental indentures and forms of debt securities containing the terms of the debt securities being offered will be filed as exhibits to the registration statement of which this prospectus is a part or will be incorporated by reference from a current report on Form 8-K that we file with the SEC, as applicable.

Warrants

We may issue warrants for the purchase of common stock, preferred stock and/or debt securities, in one or more series. We may issue warrants independently or together with common stock, preferred stock and/or debt securities, and the warrants may be attached to or separate from these securities. In this prospectus, we have summarized certain general features of the warrants. We urge you, however, to read the prospectus supplements related to the particular series of warrants being offered, as well as the warrant agreements and warrant certificates that contain the terms of the warrants. Forms of the warrant agreements and forms of warrant certificates containing the terms of the warrants being offered will be filed as exhibits to amendments to the registration statement of which this prospectus is a part, or will be incorporated by reference from a current report on Form 8-K that we file with the SEC, as applicable.

We may evidence each series of warrants by warrant certificates that would issue under a separate agreement that we may enter into with a warrant agent. Each warrant agent, if one is appointed, will

Table of Contents

be a bank or trust company that we select. We will indicate the name and address of the warrant agent, if one is appointed, in the applicable prospectus supplement relating to a particular series of warrants.

Units

We may issue units consisting of common stock, preferred stock, debt securities and/or warrants for the purchase of common stock, preferred stock and/or debt securities in one or more series. In this prospectus, we have summarized certain general features of the units. We urge you, however, to read the prospectus supplements related to the series of units being offered, as well as the unit agreements that contain the terms of the units. We will file as exhibits to the registration statement of which this prospectus is a part, or will incorporate by reference from a current report on Form 8-K that we file with the SEC, the form of unit agreement and any supplemental agreements that describe the terms of the series of units we are offering before the issuance of the related series of units.

RISK FACTORS

Investing in our securities involves risk. The prospectus supplement applicable to each offering of our securities will contain a discussion of the risks applicable to an investment in us. Prior to making a decision about investing in our securities, you should carefully consider the specific factors discussed under the heading "Risk Factors" in the applicable prospectus supplement, together with all of the other information contained or incorporated by reference in the prospectus supplement or appearing or incorporated by reference in this prospectus. You should also consider the risks, uncertainties and assumptions discussed under the heading "Risk Factors" included in our most recent annual report on Form 10-K, which is on file with the SEC and is incorporated herein by reference, and which may be amended, supplemented or superseded from time to time by other reports we file with the SEC in the future. The risks and uncertainties we have described are not the only ones we face. Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also affect our operations.

RATIO OF EARNINGS TO FIXED CHARGES

We did not record earnings for any of the years ended June 30, 2009, 2008, 2007, 2006 or 2005 or for the six months ended December 31, 2009. Accordingly, our earnings were insufficient to cover fixed charges in such periods and we are unable to disclose a ratio of earnings to fixed charges. The following table sets forth, for each of the periods presented, the dollar amount of the deficiency of earnings available to cover fixed charges. For purposes of computing the deficiency of earnings to cover fixed charges, "earnings" consist of loss from operations before income taxes and fixed charges. "Fixed charges" consist of the estimated portion of operating lease expense that represents interest.

	Six Months Ended December 31,	Year Ended June 30,				
In thousands	**2009**	**2009**	**2008**	**2007**	**2006**	**2005**
Deficiency of Earnings to Cover Fixed Charges	$ 25,545	$ 32,037	$ 31,993	$ 18,952	$ 17,817	$ 10,922

Table of Contents

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

The SEC encourages companies to disclose forward-looking information so that investors can better understand a company's future prospects and make informed investment decisions. This prospectus and the documents we have filed with the SEC that are incorporated herein by reference contain such "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995.

Words such as "may," "anticipate," "estimate," "expects," "projects," "intends," "plans," "believes" and words and terms of similar substance used in connection with any discussion of future operating or financial performance, identify forward-looking statements. Forward-looking statements represent management's present judgment regarding future events and are subject to a number of risks and uncertainties that could cause actual results to differ materially from those described in the forward-looking statements. These risks include, but are not limited to, risks and uncertainties regarding our preclinical studies, our ability to conduct clinical trials of our product candidates and the results of such trials, as well as risks and uncertainties relating to litigation, government regulation and third-party reimbursement, economic conditions, markets, products, competition, intellectual property, services and prices, key employees, future capital needs, dependence on our collaborators and other factors. Please also see the discussion of risks and uncertainties under "Risk Factors" contained in this prospectus and in any supplements to this prospectus and in our most recent annual report on Form 10-K, as revised or supplemented by our most recent quarterly report on Form 10-Q, as well as any amendments thereto, as filed with the SEC and which are incorporated herein by reference.

In light of these assumptions, risks and uncertainties, the results and events discussed in the forward-looking statements contained in this prospectus or in any document incorporated herein by reference might not occur. Investors are cautioned not to place undue reliance on the forward-looking statements, which speak only as of the date of this prospectus or the date of the document incorporated by reference in this prospectus. We are not under any obligation, and we expressly disclaim any obligation, to update or alter any forward-looking statements, whether as a result of new information, future events or otherwise. All subsequent forward-looking statements attributable to us or to any person acting on our behalf are expressly qualified in their entirety by the cautionary statements contained or referred to in this section.

USE OF PROCEEDS

We cannot assure you that we will receive any proceeds in connection with securities offered pursuant to this prospectus. Unless otherwise indicated in the applicable prospectus supplement, we intend to use any net proceeds from the sale of securities under this prospectus for our operations and for other general corporate purposes, including, but not limited to, working capital, development of our clinical and preclinical product candidates, intellectual property protection and enforcement, capital expenditures, investments and acquisitions. Pending use of the net proceeds as described above, we intend to invest the net proceeds in accordance with our investment policy guidelines, which currently provide for investment of funds in cash equivalents, short-term high-quality highly liquid investment funds, United States government obligations, high grade and corporate notes and commercial paper.

Table of Contents

PLAN OF DISTRIBUTION

We may offer securities under this prospectus from time to time pursuant to underwritten public offerings, negotiated transactions, block trades or a combination of these methods. We may sell the securities (1) through underwriters or dealers, (2) through agents or (3) directly to one or more purchasers, or through a combination of such methods. We may distribute the common stock from time to time in one or more transactions at:

a fixed price or prices, which may be changed;

market prices prevailing at the time of sale;

prices related to the prevailing market prices; or

negotiated prices.

We may directly solicit offers to purchase the securities being offered by this prospectus. We may also designate agents to solicit offers to purchase the securities from time to time. We will name in a prospectus supplement any underwriter or agent involved in the offer or sale of the securities.

If we utilize a dealer in the sale of the securities being offered by this prospectus, we will sell the securities to the dealer, as principal. The dealer may then resell the securities to the public at varying prices to be determined by the dealer at the time of resale.

If we utilize an underwriter in the sale of the securities being offered by this prospectus, we will execute an underwriting agreement with the underwriter at the time of sale, and we will provide the name of any underwriter in the prospectus supplement which the underwriter will use to make resales of the securities to the public. In connection with the sale of the securities, we, or the purchasers of the securities for whom the underwriter may act as agent, may compensate the underwriter in the form of underwriting discounts or commissions. The underwriter may sell the securities to or through dealers, and the underwriter may compensate those dealers in the form of discounts, concessions or commissions.

With respect to underwritten public offerings, negotiated transactions and block trades, we will provide in the applicable prospectus supplement any compensation we pay to underwriters, dealers or agents in connection with the offering of the securities, and any discounts, concessions or commissions allowed by underwriters to participating dealers. Underwriters, dealers and agents participating in the distribution of the securities may be deemed to be underwriters within the meaning of the Securities Act of 1933, as amended, or the Securities Act, and any discounts and commissions received by them and any profit realized by them on resale of the securities may be deemed to be underwriting discounts and commissions. We may enter into agreements to indemnify underwriters, dealers and agents against civil liabilities, including liabilities under the Securities Act, or to contribute to payments they may be required to make in respect thereof.

Shares of our common stock sold pursuant to the registration statement of which this prospectus is a part will be authorized for quotation and trading on The Nasdaq Global Market. The applicable prospectus supplement will contain information, where applicable, as to any other listing, if any, on The Nasdaq Global Market or any securities market or other securities exchange of the securities covered by the prospectus supplement. To facilitate the offering of the securities, certain persons participating in the offering may engage in transactions that stabilize, maintain or otherwise affect the price of the securities. This may include over-allotments or short sales of the securities, which involve the sale by persons participating in the offering of more securities than we sold to them. In these circumstances, these persons would cover such over-allotments or short positions by making purchases in the open market or by exercising their over-allotment option. In addition, these persons may stabilize or maintain the price of the securities by bidding for or purchasing the applicable security in the open market or by imposing penalty bids, whereby selling concessions allowed to dealers participating in the offering may be reclaimed if the securities sold by them are repurchased in connection with stabilization transactions. The effect of these transactions may be to stabilize or maintain the market price of the securities at a level above that which might otherwise prevail in the open market. These transactions may be discontinued at any time.

The underwriters, dealers and agents may engage in other transactions with us, or perform other services for us, in the ordinary course of their business.

7

Table of Contents

DESCRIPTION OF COMMON STOCK

We are authorized to issue 100,000,000 shares of common stock, par value $.01 per share. On April 21, 2010, we had 57,460,926 shares of common stock outstanding and approximately 510 shareholders of record.

The following summary of certain provisions of our common stock does not purport to be complete. You should refer to our restated articles of organization and our amended and restated by-laws, both of which are included as exhibits to the registration statement we have filed with the SEC in connection with this offering. The summary below is also qualified by provisions of applicable law.

General

Holders of common stock are entitled to one vote for each share held of record on all matters submitted to a vote of the shareholders, and do not have cumulative voting rights. Subject to preferences that may be applicable to any outstanding shares of preferred stock, holders of common stock are entitled to receive ratably such dividends, if any, as may be declared from time to time by our board of directors out of funds legally available for dividend payments. All shares of common stock outstanding as of the date of this prospectus and, upon issuance and sale, all shares of common stock that we may offer pursuant to this prospectus, will be fully paid and nonassessable. The holders of common stock have no preferences or rights of conversion, exchange, pre-emption or other subscription rights. There are no redemption or sinking fund provisions applicable to the common stock. In the event of any liquidation, dissolution or winding-up of our affairs, holders of common stock will be entitled to share ratably in our assets that are remaining after payment or provision for payment of all of our debts and obligations and after liquidation payments to holders of outstanding shares of preferred stock, if any.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Mellon Investor Services, LLC.

The Nasdaq Global Market

Our common stock is listed for quotation on The Nasdaq Global Market under the symbol "IMGN." On April 21, 2010, the last reported sale price of our common stock was $9.73 per share.

DESCRIPTION OF PREFERRED STOCK

We are authorized to issue 5,000,000 shares of preferred stock, par value $.01 per share. As of April 21, 2010, no shares of our preferred stock were issued and outstanding. The following summary of certain provisions of our preferred stock does not purport to be complete. You should refer to our restated articles of organization and our amended and restated by-laws, both of which are included as exhibits to the registration statement we have filed with the SEC in connection with this offering. The summary below is also qualified by provisions of applicable law.

General

Our board of directors may, without further action by our shareholders, from time to time, direct the issuance of shares of preferred stock in series and may, at the time of issuance, determine the rights, preferences and limitations of each series, including voting rights, dividend rights and redemption and liquidation preferences. Satisfaction of any dividend preferences of outstanding shares of preferred stock would reduce the amount of funds available for the payment of dividends on shares of our common stock. Holders of shares of preferred stock may be entitled to receive a preference payment in the event of any liquidation, dissolution or winding-up of our company before any payment is made to the holders of shares of our common stock. In some circumstances, the issuance of shares of preferred stock may render more difficult or tend to discourage a merger, tender offer or proxy

Table of Contents

contest, the assumption of control by a holder of a large block of our securities or the removal of incumbent management. Upon the affirmative vote of our board of directors, without shareholder approval, we may issue shares of preferred stock with voting and conversion rights which could adversely affect the holders of shares of our common stock.

If we offer a specific series of preferred stock under this prospectus, we will describe the terms of the preferred stock in the prospectus supplement for such offering and will file a copy of the certificate establishing the terms of the preferred stock with the SEC. To the extent required, this description will include:

the title and stated value;

the number of shares offered, the liquidation preference per share and the purchase price;

the dividend rate(s), period(s) and/or payment date(s), or method(s) of calculation for such dividends;

whether dividends will be cumulative or non-cumulative and, if cumulative, the date from which dividends will accumulate;

the procedures for any auction and remarketing, if any;

the provisions for a sinking fund, if any;

the provisions for redemption, if applicable;

any listing of the preferred stock on any securities exchange or market;

whether the preferred stock will be convertible into our common stock, and, if applicable, the conversion price (or how it will be calculated) and conversion period;

whether the preferred stock will be exchangeable into debt securities, and, if applicable, the exchange price (or how it will be calculated) and exchange period;

voting rights, if any, of the preferred stock;

a discussion of any material and/or special United States federal income tax considerations applicable to the preferred stock;

the relative ranking and preferences of the preferred stock as to dividend rights and rights upon liquidation, dissolution or winding up of the affairs of ImmunoGen; and

any material limitations on issuance of any class or series of preferred stock ranking senior to or on a parity with the series of preferred stock as to dividend rights and rights upon liquidation, dissolution or winding up of ImmunoGen.

9

Table of Contents

DESCRIPTION OF DEBT SECURITIES

The following description, together with the additional information we include in any applicable prospectus supplements, summarizes the material terms and provisions of the debt securities that we may offer under this prospectus. While the terms we have summarized below will apply generally to any future debt securities we may offer pursuant to this prospectus, we will describe the particular terms of any debt securities that we may offer in more detail in the applicable prospectus supplement. If we so indicate in a prospectus supplement, the terms of any debt securities we offer under that prospectus supplement may differ from the terms we describe below, and to the extent the terms set forth in a prospectus supplement differ from the terms described below, the terms set forth in the prospectus supplement shall control.

We may sell from time to time, in one or more offerings under this prospectus, debt securities, which may be senior or subordinated. We will issue any such senior debt securities under a senior indenture that we will enter into with a trustee to be named in the senior indenture. We will issue any such subordinated debt securities under a subordinated indenture, which we will enter into with a trustee to be named in the subordinated indenture. We have filed forms of these documents as exhibits to the registration statement, which includes this prospectus. We use the term "indentures" to refer to both the senior indenture and the subordinated indenture. The indentures will be qualified under the Trust Indenture Act of 1939, as in effect on the date of the indenture, or the Trust Indenture Act. We use the term "debenture trustee" to refer to either the trustee under the senior indenture or the trustee under the subordinated indenture, as applicable.

The following summaries of material provisions of the senior debt securities, the subordinated debt securities and the indentures are subject to, and qualified in their entirety by reference to, all the provisions of the indenture applicable to a particular series of debt securities.

General

Each indenture provides that debt securities may be issued from time to time in one or more series and may be denominated and payable in United States dollars or foreign currencies or units based on or relating to United States dollars or foreign currencies, including euros. Neither indenture limits the amount of debt securities that may be issued thereunder, and each indenture provides that the specific terms of any series of debt securities shall be set forth in, or determined pursuant to, an authorizing resolution and/or a supplemental indenture, if any, relating to such series.

We will describe in each prospectus supplement the following terms relating to a series of debt securities:

- the title;
- the aggregate principal amount and any limit on the amount that may be issued;
- the currency or units based on or relating to currencies in which debt securities of such series are denominated and the currency or units in which principal or interest or both will or may be payable;
- whether we will issue the series of debt securities in global form, the terms of any global securities and who the depositary will be;
- the maturity date and the date or dates on which principal will be payable;
- the interest rate, which may be fixed or variable, or the method for determining the rate and the date interest will begin to accrue, the date or dates interest will be payable and the record dates for interest payment dates or the method for determining such dates;

Table of Contents

whether or not the debt securities will be secured or unsecured, and the terms of any secured debt;

the terms of the subordination of any series of subordinated debt;

the place or places where payments will be payable;

our right, if any, to defer payment of interest and the maximum length of any such deferral period;

the date, if any, after which, and the price at which, we may, at our option, redeem the series of debt securities pursuant to any optional redemption provisions;

the date, if any, on which, and the price at which we are obligated, pursuant to any mandatory sinking fund provisions or otherwise, to redeem, or at the holder's option to purchase, the series of debt securities;

whether the indenture will restrict our ability to pay dividends, or will require us to maintain any asset ratios or reserves;

whether we will be restricted from incurring any additional indebtedness;

a discussion on any material or special United States federal income tax considerations applicable to a series of debt securities;

the denominations in which we will issue the series of debt securities, if other than denominations of $1,000 and any integral multiple thereof; and

any other specific terms, preferences, rights or limitations of, or restrictions on, the debt securities.

We may issue debt securities that provide for an amount less than their stated principal amount to be due and payable upon declaration of acceleration of their maturity pursuant to the terms of the indenture. We will provide you with information on the federal income tax considerations and other special considerations applicable to any of these debt securities in the applicable prospectus supplement.

Conversion or Exchange Rights

We will set forth in the prospectus supplement the terms, if any, on which a series of debt securities may be convertible into or exchangeable for our common stock or our other securities. We will include provisions as to whether conversion or exchange is mandatory, at the option of the holder or at our option. We may include provisions pursuant to which the number of shares of our common stock or our other securities that the holders of the series of debt securities receive would be subject to adjustment.

Consolidation, Merger or Sale; No Protection in Event of a Change of Control or Highly Leveraged Transaction

The indentures may not contain any covenant that restricts our ability to merge or consolidate, or sell, convey, transfer or otherwise dispose of all or substantially all of our assets. However, any successor to or acquirer of such assets will be required to assume all of our obligations under the indentures or the debt securities, as appropriate.

Unless we state otherwise in the applicable prospectus supplement, the debt securities will not contain any provisions that may afford holders of the debt securities protection in the event we have a change of control or in the event of a highly leveraged transaction (whether or not

such transaction results in a change of control), which could adversely affect holders of debt securities.

Table of Contents

Events of Default Under the Indenture

The following will be events of default under the indentures with respect to any series of debt securities that we may issue:

- if we fail to pay interest when due and our failure continues for 90 days and the time for payment has not been extended or deferred;
- if we fail to pay the principal, or premium, if any, when due and the time for payment has not been extended or delayed;
- if we fail to observe or perform any other covenant relating to such series contained in the debt securities of such series or the applicable indentures, other than a covenant specifically relating to and for the benefit of holders of another series of debt securities, and our failure continues for 90 days after we receive written notice from the debenture trustee or holders of not less than a majority in aggregate principal amount of the outstanding debt securities of the applicable series; and
- if specified events of bankruptcy, insolvency or reorganization occur as to us.

No event of default with respect to a particular series of debt securities (except as to certain events of bankruptcy, insolvency or reorganization) necessarily constitutes an event of default with respect to any other series of debt securities. The occurrence of an event of default may constitute an event of default under any bank credit agreements we may have in existence from time to time. In addition, the occurrence of certain events of default or an acceleration under the indenture may constitute an event of default under certain of our other indebtedness outstanding from time to time.

If an event of default with respect to debt securities of any series at the time outstanding occurs and is continuing, then the trustee or the holders of not less than a majority in principal amount of the outstanding debt securities of that series may, by a notice in writing to us (and to the debenture trustee if given by the holders), declare to be due and payable immediately the principal (or, if the debt securities of that series are discount securities, that portion of the principal amount as may be specified in the terms of that series) of and premium and accrued and unpaid interest, if any, on all debt securities of that series. Before a judgment or decree for payment of the money due has been obtained with respect to debt securities of any series, the holders of a majority in principal amount of the outstanding debt securities of that series (or, at a meeting of holders of such series at which a quorum is present, the holders of a majority in principal amount of the debt securities of such series represented at such meeting) may rescind and annul the acceleration if all events of default, other than the non-payment of accelerated principal, premium, if any, and interest, if any, with respect to debt securities of that series, have been cured or waived as provided in the applicable indenture (including payments or deposits in respect of principal, premium or interest that had become due other than as a result of such acceleration). We refer you to the prospectus supplement relating to any series of debt securities that are discount securities for the particular provisions relating to acceleration of a portion of the principal amount of such discount securities upon the occurrence of an event of default.

Subject to the terms of the indentures, if an event of default under an indenture shall occur and be continuing, the debenture trustee will be under no obligation to exercise any of its rights or powers under such indenture at the request or direction of any of the holders of the applicable series of debt securities, unless such holders have offered the debenture trustee reasonable indemnity. The holders of a majority in principal amount of the outstanding debt securities of any series will have the right to direct the time, method and place of conducting any proceeding for any remedy available to the

Table of Contents

debenture trustee or exercising any trust or power conferred on the debenture trustee, with respect to the debt securities of that series, provided that:

- the direction so given by the holder is not in conflict with any law or the applicable indenture; and
- subject to its duties under the Trust Indenture Act, the debenture trustee need not take any action that might involve it in personal liability or might be unduly prejudicial to the holders not involved in the proceeding.

A holder of the debt securities of any series will only have the right to institute a proceeding under the indentures or to appoint a receiver or trustee, or to seek other remedies if:

- the holder previously has given written notice to the debenture trustee of a continuing event of default with respect to that series;
- the holders of at least a majority in aggregate principal amount of the outstanding debt securities of that series have made written request, and such holders have offered reasonable indemnity to the debenture trustee to institute the proceeding as trustee; and
- the debenture trustee does not institute the proceeding, and does not receive from the holders of a majority in aggregate principal amount of the outstanding debt securities of that series (or at a meeting of holders of such series at which a quorum is present, the holders of a majority in principal amount of the debt securities of such series represented at such meeting) other conflicting directions within 60 days after the notice, request and offer.

These limitations will not apply to a suit instituted by a holder of debt securities if we default in the payment of the principal, premium, if any, or interest on, the debt securities.

We will periodically file statements with the applicable debenture trustee regarding our compliance with specified covenants in the applicable indenture.

Modification of Indenture; Waiver

The debenture trustee and we may change the applicable indenture without the consent of any holders with respect to specific matters, including:

- to fix any ambiguity, defect or inconsistency in the indenture; and
- to change anything that does not materially adversely affect the interests of any holder of debt securities of any series issued pursuant to such indenture.

In addition, under the indentures, the rights of holders of a series of debt securities may be changed by us and the debenture trustee with the written consent of the holders of at least a majority in aggregate principal amount of the outstanding debt securities of each series (or, at a meeting of holders of such series at which a quorum is present, the holders of a majority in principal amount of the debt securities of such series represented at such meeting) that is affected. However, the debenture trustee and we may make the following changes only with the consent of each holder of any outstanding debt securities affected:

extending the fixed maturity of the series of debt securities;

reducing the principal amount, reducing the rate of or extending the time of payment of interest, or a premium payable upon the redemption of any debt securities;

reducing the principal amount of discount securities payable upon acceleration of maturity;

making the principal of or premium or interest on any debt security payable in currency other than that stated in the debt security; or

Table of Contents

reducing the percentage of debt securities, the holders of which are required to consent to any amendment or waiver.

Except for certain specified provisions, the holders of at least a majority in principal amount of the outstanding debt securities of any series (or, at a meeting of holders of such series at which a quorum is present, the holders of a majority in principal amount of the debt securities of such series represented at such meeting) may on behalf of the holders of all debt securities of that series waive our compliance with provisions of the indenture. The holders of a majority in principal amount of the outstanding debt securities of any series may on behalf of the holders of all the debt securities of such series waive any past default under the indenture with respect to that series and its consequences, except a default in the payment of the principal of, premium or any interest on any debt security of that series or in respect of a covenant or provision, which cannot be modified or amended without the consent of the holder of each outstanding debt security of the series affected; provided, however, that the holders of a majority in principal amount of the outstanding debt securities of any series may rescind an acceleration and its consequences, including any related payment default that resulted from the acceleration.

Discharge

Each indenture will provide that we can elect to be discharged from our obligations with respect to one or more series of debt securities, except for obligations to:

register the transfer or exchange of debt securities of the series;

replace stolen, lost or mutilated debt securities of the series;

maintain paying agencies;

hold monies for payment in trust;

compensate and indemnify the trustee; and

appoint any successor trustee.

In order to exercise our rights to be discharged with respect to a series, we will have to deposit with the trustee money or government obligations sufficient to pay all the principal of, any premium, if any, and interest on, the debt securities of the series on the dates payments are due.

Form, Exchange, and Transfer

We will issue the debt securities of each series only in fully registered form without coupons and, unless we otherwise specify in the applicable prospectus supplement, in denominations of $1,000 and any integral multiple thereof. The indentures provide that we may issue debt securities of a series in temporary or permanent global form and as book-entry securities that will be deposited with, or on behalf of, The Depository Trust Company or another depositary named by us and identified in a prospectus supplement with respect to that series.

At the option of the holder, subject to the terms of the indentures and the limitations applicable to global securities described in the applicable prospectus supplement, the holder of the debt securities of any series can exchange the debt securities for other debt securities of the same series, in any authorized denomination and of like tenor and aggregate principal amount.

Subject to the terms of the indentures and the limitations applicable to global securities set forth in the applicable prospectus supplement, holders of the debt securities may present the debt securities for exchange or for registration of transfer, duly endorsed or with the form of transfer endorsed thereon duly executed if so required by us or the security registrar, at the office of the security registrar or at the office of any transfer agent designated by us for this purpose. Unless otherwise provided in

Table of Contents

the debt securities that the holder presents for transfer or exchange or in the applicable indenture, we will make no service charge for any registration of transfer or exchange, but we may require payment of any taxes or other governmental charges.

We will name in the applicable prospectus supplement the security registrar, and any transfer agent in addition to the security registrar, that we initially designate for any debt securities. We may at any time designate additional transfer agents or rescind the designation of any transfer agent or approve a change in the office through which any transfer agent acts, except that we will be required to maintain a transfer agent in each place of payment for the debt securities of each series.

If we elect to redeem the debt securities of any series, we will not be required to:

- issue, register the transfer of, or exchange any debt securities of that series during a period beginning at the opening of business 15 days before the day of mailing of a notice of redemption of any debt securities that may be selected for redemption and ending at the close of business on the day of the mailing; or

- register the transfer of or exchange any debt securities so selected for redemption, in whole or in part, except the unredeemed portion of any debt securities we are redeeming in part.

Information Concerning the Debenture Trustee

The debenture trustee other than during the occurrence and continuance of an event of default under the applicable indenture, will undertake to perform only those duties as are specifically set forth in the applicable indenture. Upon an event of default under an indenture, the debenture trustee under such indenture must use the same degree of care as a prudent person would exercise or use in the conduct of his or her own affairs. Subject to this provision, the debenture trustee is under no obligation to exercise any of the powers given it by the indentures at the request of any holder of debt securities unless it is offered reasonable security and indemnity against the costs, expenses and liabilities that it might incur.

Payment and Paying Agents

Unless we indicate otherwise in the applicable prospectus supplement, on any interest payment date, we will pay the interest on any debt securities to the person in whose name such debt securities, or one or more predecessor securities, are registered at the close of business on the regular record date for the interest.

We will pay principal of and any premium and interest on the debt securities of a particular series at the office of the paying agents designated by us, except that unless we otherwise indicate in the applicable prospectus supplement, will we make interest payments by check which we will mail to the holder. Unless we otherwise indicate in a prospectus supplement, we will designate the corporate trust office of the debenture trustee in the City of New York as our sole paying agent for payments with respect to debt securities of each series. We will name in the applicable prospectus supplement any other paying agents that we initially designate for the debt securities of a particular series. We will maintain a paying agent in each place of payment for the debt securities of a particular series.

All money we pay to a paying agent or the debenture trustee for the payment of the principal of or any premium or interest on any debt securities which remains unclaimed at the end of two years after such principal, premium or interest has become due and payable will be repaid to us, and the holder of the security thereafter may look only to us for payment thereof.

Table of Contents

Governing Law

The indentures and the debt securities will be governed by and construed in accordance with the laws of the State of New York, except to the extent that the Trust Indenture Act is applicable.

Subordination of Subordinated Debt Securities

Our obligations pursuant to any subordinated debt securities will be unsecured and will be subordinate and junior in priority of payment to certain of our other indebtedness to the extent described in a prospectus supplement. The subordinated indenture does not limit the amount of senior indebtedness we may incur. It also does not limit us from issuing any other secured or unsecured debt.

DESCRIPTION OF WARRANTS

We may issue warrants to purchase shares of our common stock, preferred stock and/or debt securities in one or more series together with other securities or separately, as described in the applicable prospectus supplement. Below is a description of certain general terms and provisions of the warrants that we may offer. Particular terms of the warrants will be described in the warrant agreements and the prospectus supplement to the warrants.

The applicable prospectus supplement will contain, where applicable, the following terms of and other information relating to the warrants:

- the specific designation and aggregate number of, and the price at which we will issue, the warrants;
- the currency or currency units in which the offering price, if any, and the exercise price are payable;
- the designation, amount and terms of the securities purchasable upon exercise of the warrants;
- if applicable, the exercise price for shares of our common stock and the number of shares of common stock to be received upon exercise of the warrants;
- if applicable, the exercise price for shares of our preferred stock, the number of shares of preferred stock to be received upon exercise, and a description of that series of our preferred stock;
- if applicable, the exercise price for our debt securities, the amount of debt securities to be received upon exercise, and a description of that series of debt securities;
- the date on which the right to exercise the warrants will begin and the date on which that right will expire or, if you may not continuously exercise the warrants throughout that period, the specific date or dates on which you may exercise the warrants;
- whether the warrants will be issued in fully registered form or bearer form, in definitive or global form or in any combination of these forms, although, in any case, the form of a warrant included in a unit will correspond to the form of the unit and of any security included in that unit;
- any applicable material United States federal income tax consequences;

if applicable, the identity of the warrant agent for the warrants and of any other depositaries, execution or paying agents, transfer agents, registrars or other agents;

the proposed listing, if any, of the warrants or any securities purchasable upon exercise of the warrants on any securities exchange;

Table of Contents

if applicable, the date from and after which the warrants and the common stock, preferred stock and/or debt securities will be separately transferable;

if applicable, the minimum or maximum amount of the warrants that may be exercised at any one time;

information with respect to book-entry procedures, if any;

the anti-dilution provisions of the warrants, if any;

any redemption or call provisions;

whether the warrants are to be sold separately or with other securities as parts of units; and

any additional terms of the warrants, including terms, procedures and limitations relating to the exchange and exercise of the warrants.

DESCRIPTION OF UNITS

We may issue units consisting of common stock, preferred stock, debt securities and/or warrants for the purchase of common stock, preferred stock and/or debt securities in one or more series. In this prospectus, we have summarized certain general features of the units. We urge you, however, to read the prospectus supplements related to the series of units being offered, as well as the unit agreements that contain the terms of the units. We will file as exhibits to an amendment to the registration statement of which this prospectus is a part, or will incorporate by reference from a current report on Form 8-K that we file with the SEC, as applicable, the form of unit agreement and any supplemental agreements that describe the terms of the series of units we are offering before the issuance of the related series of units.

We may evidence each series of units by unit certificates that would issue under a separate agreement that we may enter into with a unit agent. Each unit agent, if one is appointed, will be a bank or trust company that we select. We will indicate the name and address of the unit agent, if one is appointed, in the applicable prospectus supplement relating to a particular series of units.

Table of Contents

CERTAIN PROVISIONS OF MASSACHUSETTS LAW AND OF THE COMPANY'S ARTICLES OF ORGANIZATION AND BY-LAWS

Anti-Takeover Provisions under Massachusetts law and our Massachusetts Articles of Organization and By-laws

Provisions of Massachusetts law and our restated articles of organization and amended and restated by-laws contain other provisions that are intended to enhance the likelihood of continuity and stability in the composition of the board of directors and which may have the effect of delaying, deferring or preventing a future takeover or change in control of our company unless such takeover or change in control is approved by our board of directors.

These provisions, summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that the benefits of increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us outweigh the disadvantages of discouraging these proposals because negotiation of these proposals could result in an improvement of their terms.

Massachusetts statutory business combinations provisions. We are subject to Chapter 110F of the Massachusetts General Laws, an anti-takeover law. In general, this statute prohibits a publicly-held Massachusetts corporation from engaging in a "business combination" with an "interested stockholder" for a period of three years after the date of the transaction in which the person becomes an interested stockholder, unless (i) the interested stockholder obtains the approval of the board of directors prior to becoming an interested stockholder, (ii) the interested stockholder acquires 90% of the outstanding voting stock of the corporation (excluding shares held by certain affiliates of the corporation) at the time it becomes an interested stockholder, or (iii) the business combination is approved by both the board of directors and the holders of two-thirds of the outstanding voting stock of the corporation (excluding shares held by the interested stockholder). Generally, an 'interested stockholder" is a person who, together with affiliates and associates, owns (or at any time within the prior three years did own) 5% or more of the outstanding voting stock of the corporation. A "business combination" includes a merger, a stock or asset sale, and certain other transactions resulting in a financial benefit to the interested shareholders.

Massachusetts General Laws Chapter 110D, entitled "Regulation of Control Share Acquisitions," in general provides that any shareholder of a company subject to this statute who acquires 20% or more of the outstanding voting stock of a company may not vote such stock unless the shareholders of the company so authorize. Although our amended and restated by-laws currently exclude us from this statute, the board of directors may amend our by-laws to subject us to this statute prospectively.

Chapter 110C of the Massachusetts General Laws requires the person commencing a takeover bid to file certain information with the Secretary of the Commonwealth and the target company and provides that a bidder who fails to disclose its intent to gain control over a target corporation prior to acquiring 5% of the target company's stock is precluded from making any takeover bid for a period of one year after crossing the 5% threshold.

Blank check preferred stock. Our restated article of organization allows our board of directors to issue shares of preferred stock without the approval of our shareholders, so called "blank check" preferred stock. The effects of such issuance, among other things, could include the dilution in the voting power of our common stock if the preferred stock has voting rights and the reduction or restriction in the rights of holders of our common stock to receive a payment in the event of any liquidation, dissolution or winding-up of our company. In some circumstances, the issuance of shares of preferred stock may render more difficult or expensive or tend to discourage a merger, tender offer or proxy contest, the assumption of control by a holder of a large block of our securities or the removal of incumbent management. In addition, the board of directors could also utilize the shares of preferred

Table of Contents

stock in order to adopt a shareholder rights plan, or "poison pill," which could have the effect of discouraging or delaying a takeover of the company.

Advance notice provisions for shareholder proposals and shareholder nominations of directors. Our amended and restated by-laws provide that, for nominations to the board of directors or for other business to be properly brought by a shareholder before a meeting of shareholders, the shareholder must first have given timely notice of the proposal in writing to our Secretary. For an annual meeting, a shareholder's notice generally must be delivered not less than 45 days nor more than 75 days prior to the anniversary of the mailing date of the proxy statement for the previous year's annual meeting. For special meetings called to elect directors, a shareholder's notice must generally be delivered not less than 60 days (or ten days after public disclosure of the meeting date if later) nor more than 90 days prior to the meeting. Detailed requirements as to the form of the notice and information required in the notice are specified in the amended and amended and restated by-laws. If it is determined that business was not properly brought before a meeting in accordance with our amended and restated by-laws, such business will not be conducted at the meeting. Although our by-laws do not give our board of directors the power to approve or disapprove shareholder nominations of candidates or proposals regarding other business to be conducted at a special or annual meeting, our by-laws may have the effect of precluding the conduct of some business at a meeting if the proper procedures are not followed or may discourage or defer a potential acquirer from conducting a solicitation of proxies to elect its own slate of directors or otherwise attempting to obtain control of us.

Classified board of directors. Section 8.06(b) of the Massachusetts Business Corporation Act provides that unless a company decides otherwise, the terms of directors of a public Massachusetts company shall be staggered by dividing the directors into three groups, as nearly equal in number as possible, with only one group of directors being elected each year. Sections 8.06(d) and (e) of the Massachusetts Business Corporation Act provide that when directors are so classified, (i) shareholders may remove directors only for cause, (ii) the number of directors shall be fixed only by the vote of the board of directors, (iii) vacancies and newly created directorships shall be filled solely by the affirmative vote of a majority of the remaining directors, and (iv) a decrease in the number of directors will not shorten the term of any incumbent director. Our board of directors opted out of this staggered board of directors requirement, and all of our directors currently serve for one-year terms and are elected annually. Under Section 8.06(c)(2) of the Massachusetts Business Corporation Act, our board of directors may opt into the staggered board of directors requirements of Section 8.06(b) and application of Sections 8.06(d) and (e). If the board of directors opts into this structure, these provisions are likely to increase the time required for shareholders to change the composition of the board of directors. For example, in general, at least two annual meetings would be necessary for shareholders to effect a change in a majority of the members of the board of directors. The provision for a classified board could prevent a party who acquires control of a large portion of our outstanding common stock from obtaining control of our board of directors until our second annual shareholders meeting following the date the acquirer obtains the stock interest. The classified board provision could have the effect of discouraging a potential acquirer from making a tender offer or otherwise attempting to obtain control of us and could increase the likelihood that incumbent directors will retain their positions.

Shareholder can only act by unanimous written consent and restrictions on who can call a special meeting of shareholders. Although our restated articles of organization and amended and restated by-laws allow our shareholders to act by written consent, such written consent must be signed by all shareholders entitled to vote on the matter approved. This significantly restricts the ability of our shareholders to act by written consent and essentially provides that our shareholders may only act at a duly called shareholders meeting. In addition, special meetings of the shareholders may be called only by our President, our board of directors and one or more shareholders holding at least 40% of our voting stock.

Limitations on Liability and Indemnification of Officers and Directors

Our restated articles of organization and amended and restated by-laws limit the liability of our officers and directors to the fullest extent permitted by the Massachusetts Business Corporation Act and provides that we will indemnify them to the fullest extent permitted by such law.

Table of Contents

LEGAL MATTERS

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts, will pass upon the validity of the issuance of the securities offered by this prospectus.

EXPERTS

The consolidated financial statements of ImmunoGen, Inc. appearing in ImmunoGen, Inc.'s Annual Report (Form 10-K) for the year ended June 30, 2009, and the effectiveness of ImmunoGen, Inc.'s internal control over financial reporting as of June 30, 2009 have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their reports thereon, included therein, and incorporated herein by reference. Such consolidated financial statements are incorporated herein by reference in reliance upon such reports given on the authority of such firm as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We are subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, and file annual, quarterly and current reports, proxy statements and other information with the SEC. You may read and copy these reports, proxy statements and other information at the SEC's public reference facilities at 100 F Street, N.E., Room 1580, Washington, D.C. 20549. You can request copies of these documents by writing to the SEC and paying a fee for the copying cost. Please call the SEC at 1-800-SEC-0330 for more information about the operation of the public reference facilities. SEC filings are also available at the SEC's web site at http://www.sec.gov. Our common stock is listed on The Nasdaq Global Market, and you can read and inspect our filings at the offices of the Financial Industry Regulatory Authority at 1735 K Street, Washington, D.C. 20006.

This prospectus is only part of a registration statement on Form S-3 that we have filed with the SEC under the Securities Act and therefore omits certain information contained in the registration statement. We have also filed exhibits and schedules with the registration statement that are excluded from this prospectus, and you should refer to the applicable exhibit or schedule for a complete description of any statement referring to any contract or other document. You may inspect a copy of the registration statement, including the exhibits and schedules, without charge, at the public reference room or obtain a copy from the SEC upon payment of the fees prescribed by the SEC.

We also maintain a website at www.immunogen.com, through which you can access our SEC filings. The information set forth on our website is not part of this prospectus.

INCORPORATION OF DOCUMENTS BY REFERENCE

The SEC allows us to "incorporate by reference" information that we file with them. Incorporation by reference allows us to disclose important information to you by referring you to those other documents. The information incorporated by reference is an important part of this prospectus, and information that we file later with the SEC will automatically update and supersede this information. Statements in this prospectus regarding the provisions of certain documents filed with, or incorporated by reference in, the registration statement are not necessarily complete and each statement is qualified in all respects by that reference. Copies of all or any part of the registration statement, including the documents incorporated by reference or the exhibits, may be obtained upon payment of the prescribed rates at the offices of the SEC listed above in "Where to Find More Information." The documents we are incorporating by reference are:

our annual report on Form 10-K for the fiscal year ended June 30, 2009 filed on August 28, 2009;

our quarterly report on Form 10-Q for the fiscal quarter ended September 30, 2009 filed on November 4, 2009;

Table of Contents

our quarterly report on Form 10-Q for the fiscal quarter ended December 31, 2009 filed on January 29, 2010;

the portions of our definitive proxy statement on Schedule 14A filed on September 30, 2009 that are deemed "filed" with the SEC under the Securities Exchange Act of 1934, as amended; and

the description of our capital stock contained in our registration statement on Form 8-A filed on September 25, 1989, as amended by Amendment No. 1 thereto, filed on November 15, 1989, under the Securities Exchange Act of 1934, as amended, including amendment or reports filed for the purpose of updating such description.

The SEC file number for each of the documents listed above is 001-17999.

In addition, all documents subsequently filed by us pursuant to Section 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended, except for information contained in any such filing where we indicate that such information is being furnished and is not considered "filed" under the Securities Exchange Act of 1934, as amended, before the date any offering under this prospectus and accompanying prospectus supplement is terminated or completed are deemed to be incorporated by reference into, and to be a part of, this prospectus.

Any statement contained in this prospectus or in a document incorporated or deemed to be incorporated by reference into this prospectus will be deemed to be modified or superseded for purposes of this prospectus to the extent that a statement contained in this prospectus or any other subsequently filed document that is deemed to be incorporated by reference into this prospectus modifies or supersedes the statement. Any statement so modified or superseded will not be deemed, except as so modified or superseded, to constitute a part of this prospectus.

We will provide without charge to each person, including any beneficial owner, to whom a copy of this prospectus is delivered, upon the request of any such person, a copy of any or all of the information incorporated herein by reference (exclusive of exhibits to such documents unless such exhibits are specifically incorporated by reference herein). Requests, whether written or oral, for such copies should be directed to ImmunoGen, Inc., Attention: Investor Relations, 830 Winter Street, Waltham, MA 02451, 781-895-0600.

You should rely only on information contained in, or incorporated by reference into, this prospectus and any prospectus supplement. We have not authorized anyone to provide you with information different from that contained in this prospectus or incorporated by reference in this prospectus. We are not making offers to sell the securities in any jurisdiction in which such an offer or solicitation is not authorized or in which the person making such offer or solicitation is not qualified to do so or to anyone to whom it is unlawful to make such offer or solicitation.

Table of Contents

8,500,000 shares

Common stock

Prospectus supplement

J.P.Morgan

You should rely only on the information contained or incorporated by reference in this prospectus supplement, the accompanying prospectus or any free writing prospectus that we have authorized for use in connection with this offering. Neither we nor the underwriters have authorized anyone to provide you with information different from that contained in this prospectus or any accompanying free writing prospectus. We are offering to sell, and seeking offers to buy, common stock only in jurisdictions where offers and sales are permitted. The information contained in this prospectus supplement, the accompanying prospectus and any accompanying free writing prospectus is accurate only as of the date of this prospectus supplement, the accompanying prospectus and any such accompanying free writing prospectus, regardless of the time of delivery of this prospectus supplement, the accompanying prospectus, any such accompanying free writing prospectus or of any sale of our common stock.

No action is being taken in any jurisdiction outside the United States to permit a public offering of the common stock or possession or distribution of this prospectus supplement, the accompanying prospectus or any free writing prospectus in that jurisdiction. Persons who come into possession of this prospectus supplement, the accompanying prospectus or any free writing prospectus in jurisdictions outside the United States are required to inform themselves about and to observe any restrictions as to this offering and the distribution of this prospectus supplement, the accompanying prospectus and any accompanying free writing prospectus applicable to that jurisdiction.

May , 2010