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Filed pursuant to Rule 424(b)(5)
Registration No. 333-223507

CALCULATION OF REGISTRATION FEE

Title of each class of securities to be registered	Amount to be registered[1]	Proposed maximum offering price per unit	Proposed maximum aggregate offering price[1]	Amount of registration fee[2]
Common Stock, $0.01 par value per share	24,523,750	$4.25	$104,225,937.50	$13,528.53

(1) Includes shares of common stock that may be purchased by the underwriters pursuant to their option to purchase additional shares of common stock.

(2) This filing fee is calculated in accordance with Rule 457(r) and relates to the Registration Statement on Form S-3 (File No. 333-223507) filed by the Registrant on March 7, 2018.

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Prospectus supplement
(to Prospectus dated March 7, 2018)

21,325,000 Shares

Common stock

We are offering 21,325,000 shares of our common stock. Our common stock is listed on The Nasdaq Global Select Market under the symbol "IMGN." On January 22, 2020, the last reported sale price of our common stock on The Nasdaq Global Select Market was $4.68 per share.

Investing in our common stock involves a high degree of risk. Please read "Risk Factors" beginning on page S-11 of this prospectus supplement and in the documents incorporated by reference into this 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.

	Per share	Total
Public offering price	$ 4.250	$ 90,631,250
Underwriting discounts and commissions[(1)]	$ 0.255	$ 5,437,875
Proceeds to ImmunoGen, before expenses	$ 3.995	$ 85,193,375

(1) We refer you to "Underwriting" beginning on page S-17 of this prospectus supplement for additional information regarding underwriting compensation.

Delivery of shares of common stock is expected to be made on or about January 27, 2020. We have granted the underwriters an option for a period of 30 days to purchase up to an additional 3,198,750 shares of our common stock.

Joint Book-Running Managers

Jefferies **Cowen** **William Blair**

Prospectus Supplement dated January 22, 2020

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Prospectus supplement

Prospectus

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 supplement, the accompanying 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. If anyone provides you with different or inconsistent information, you should not rely on it. We and the underwriters take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. The information contained in this prospectus supplement, the accompanying prospectus and any free writing prospectus that we have authorized for use in connection with this offering is accurate only as of the date of this prospectus supplement, the accompanying prospectus and any such free writing prospectus, regardless of the time of delivery of this prospectus supplement, the accompanying prospectus, any such free writing prospectus or of any sale of our common stock. Our business, financial condition, results of operations and prospects may have changed since those dates. You should read this prospectus supplement, the accompanying prospectus, the documents incorporated by reference in this prospectus supplement and the accompanying prospectus, and any free writing prospectus that we have authorized for use in connection with this offering, in their entirety before making an investment decision. You should also read and consider the information in the documents to which we have referred you in the sections of this prospectus supplement entitled "Where You Can Find More Information" and "Incorporation of Documents by Reference."

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 free writing prospectus that we have authorized for use in connection with this offering applicable to that jurisdiction.

ABOUT THIS PROSPECTUS SUPPLEMENT

On March 7, 2018, we filed with the Securities and Exchange Commission, or SEC, a registration statement on Form S-3 (File No. 333-223507), utilizing a shelf registration process relating to the securities described in this prospectus supplement, which registration statement was automatically effective upon filing. Under this shelf registration process, we may, from time to time, sell 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 this prospectus supplement or 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 prospectus supplement or 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.

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 and information incorporated by reference in this prospectus supplement and the accompanying prospectus and the information included in any free writing prospectus that we have authorized for use in connection with this offering.

Company overview

We are a clinical-stage biotechnology company focused on developing the next generation of antibody-drug conjugates, or ADCs, to improve outcomes for cancer patients. By generating targeted therapies with enhanced anti-tumor activity and favorable tolerability profiles, we aim to disrupt the progression of cancer and offer patients more good days. We call this our commitment to "target a better now."

An ADC with our proprietary technology comprises an antibody that binds to a target found on tumor cells and is conjugated to one of our potent anti-cancer agents as a "payload" to kill the tumor cell once the ADC has bound to its target. ADCs are an expanding approach to the treatment of cancer, with seven approved products and the number of agents in development growing significantly in recent years.

We have established a leadership position in ADCs with a portfolio of differentiated product candidates to address both solid tumors and hematological malignancies.

Our lead program is mirvetuximab soravtansine, a first-in-class investigational ADC targeting folate-receptor alpha, or FRa, a cell-surface protein overexpressed in a number of epithelial tumors, including ovarian, endometrial, and non-small-cell lung cancers. In March of 2019, we announced that FORWARD I, our Phase 3 clinical trial evaluating mirvetuximab compared to chemotherapy in women with FRa-positive, platinum-resistant ovarian cancer, did not meet the primary endpoint in either the entire treatment population or the pre-specified high FRa expression population. Data from FORWARD I did, however, show promising efficacy signals across a range of parameters in the pre-specified subset of patients with high FRa expression. In post hoc exploratory analyses using a PS2+ re-scoring method, in the FRa-high PS2+ re-scored population, mirvetuximab was associated with longer progression free survival, or PFS, by blinded independent review committee, or BIRC, higher overall response rate, or ORR, and longer overall survival, or OS. Following consultation with the U.S. Food and Drug Administration, or FDA, we will concurrently enroll two new trials of mirvetuximab:

- *SORAYA.* The FDA has advised us that a new single-arm trial in patients with platinum-resistant epithelial ovarian, primary or peritoneal, or fallopian tube cancer could support accelerated approval for mirvetuximab, provided that ORR and duration of response, or DOR, surpass those of the best available therapy at the time of regulatory action. The FDA further advised that prior to obtaining accelerated approval on the basis of a new single-arm trial, our planned confirmatory trial, MIRASOL, should be fully accrued. Based upon this feedback from the FDA, we plan to initiate SORAYA, a pivotal, single-arm trial to evaluate mirvetuximab monotherapy in approximately 110 women with FRa-high platinum-resistant epithelial ovarian, primary or peritoneal, or fallopian tube cancer, as measured by PS2+ scoring, who have been previously treated with bevacizumab. We have reviewed the data generated from our previous trials with mirvetuximab, including a post hoc analysis of our Phase 3 FORWARD I trial using a PS2+ re-scoring method to assess tumor samples for FRa expression, and have identified 70 patients who we believe would have met the key eligibility criteria for SORAYA. Based on a pooled analysis of these 70 patients, the ORR was 31.4% with a 95% confidence interval, or CI (20.9%, 43.6%), and a median DOR of 7.8 months with a 95%

CI (3.98, -) was observed. We believe that these data compare favorably to the response rate seen with single agent chemotherapy in platinum resistant ovarian cancer, which was 11.8% in the AURELIA trial and 12.2% in the CORAIL trial, both of which included patients naïve to and previously treated with bevacizumab. We anticipate enrolling the first patient in SORAYA during the first quarter of 2020 and expect to report topline data from this trial in mid-2021. If SORAYA is successful, we expect to submit an application for accelerated approval of mirvetuximab in this patient population to the FDA during the second half of 2021 and to thereafter seek full approval on the basis of a confirmatory Phase 3 trial, MIRASOL; and

- *MIRASOL.* MIRASOL is a randomized Phase 3 clinical trial of mirvetuximab in patients with epithelial ovarian, primary peritoneal, or fallopian tube cancers with high FRa expressiona, as measured by PS2+ scoring method. In the study, approximately 430 patients will be randomized 1:1 to receive either mirvetuximab or investigator's choice of single-agent chemotherapy (weekly paclitaxel, pegylated liposomal doxorubicin, or topotecan) for patients with platinum-resistant ovarian cancer whose tumors express high levels of FRa and who have been treated with up to three prior regimens. If mirvetuximab obtains accelerated approval based on the results of SORAYA, we expect that MIRASOL would serve as a confirmatory trial that may support full approval of mirvetuximab. We have recently opened our first sites in MIRASOL and expect to report topline data from this trial in the first half of 2022.

We undertook a review of our operations during the second quarter of 2019 with the goals of prioritizing our portfolio and reducing our cost base to ensure that our cash resources will be sufficient to advance certain of our programs through the next stages of development. Based on the outcome of this operational review and subsequent consultation with FDA, we have established three strategic priorities for the business: (i) execute SORAYA and MIRASOL and pursue the development of additional indications for mirvetuximab in ovarian cancer; (ii) advance a select portfolio of three earlier-stage product candidates; and (iii) further strengthen our balance sheet and expand capabilities through partnering. Consistent with these priorities, we have focused our operations on the following activities:

- open SORAYA and enroll patients in MIRASOL to support the potential for accelerated approval in 2022 and conversion to full approval in 2023;
- continue follow up in the ongoing Phase 1b FORWARD II companion trial of mirvetuximab in combination regimens and initiate additional combination trials to support additional indications through compendia listings;
- continue IMGN632 development in patients with acute myeloid leukemia, or AML, blastic plasmacytoid dendritic cell neoplasm, or BPDCN, and other CD123-positive hematologic malignancies in collaboration with Jazz Pharmaceuticals, PLC, or Jazz;
- advance two additional assets that demonstrate our continued innovation in ADCs: IMGC936, which is an investigational ADC directed to the novel solid tumor target, ADAM9, which we are co-developing with MacroGenics, Inc., or MacroGenics; and our next generation investigational anti- FRa ADC, IMGN151, which is expected to enter preclinical development in 2020; and
- monetize our remaining portfolio and platform technologies through out-licensing transactions or asset sales.

Corresponding to the prioritization of our portfolio, we have reduced ongoing expenses through the discontinuation of our IMGN779 development program, suspension of all other research activities, and a reduction in our workforce.

Mirvetuximab soravtansine in ovarian cancer

Mirvetuximab is an investigational ADC targeting FRa. Mirvetuximab is designed to exhibit a differentiated profile with a distinct mechanism of action and is the first ADC to enter a pivotal trial for the treatment of ovarian cancer. It comprises an FRa-binding antibody, which targets the ADC to FRa-expressing cancer

cells, conjugated to our potent DM4 payload agent that kills the targeted cancer cells. Based on our clinical experience to date, we have observed encouraging anti-tumor activity and tolerability with mirvetuximab in a range of settings within ovarian cancer, including as monotherapy and in combination with bevacizumab in patients with platinum-resistant disease and in combinations bevacizumab and carboplatin in patients with platinum-sensitive disease. Mirvetuximab has been granted orphan drug designation in the United States and orphan medicinal product status in the European Union, in each case for the treatment of ovarian cancer. Mirvetuximab has also been granted Fast Track designation by the FDA for the treatment of patients with medium to high FRa-positive platinum-resistant eplithelial ovarian cancer who received at least one but no more than three prior systemic treatment regimens and for whom single-agent chemotherapy is appropriate as the next line of therapy.

Mirvetuximab as monotherapy

We presented mature PFS and interim OS data from our Phase 3 FORWARD I clinical trial evaluating mirvetuximab compared to chemotherapy in women with FRa-positive, platinum-resistant ovarian cancer during an oral presentation at the annual European Society for Medical Oncology, or ESMO, Congress in September 2019. FORWARD I randomized 366 patients 2:1 to receive either mirvetuximab or the physician's choice of single-agent chemotherapy (pegylated liposomal doxorubicin, topotecan, or weekly paclitaxel). Eligibility criteria included patients with platinum-resistant ovarian cancer that expressed medium or high levels of FRa, who had been treated with up to three prior regimens. The primary endpoint of this trial was PFS, as assessed by BIRC. The primary endpoint was assessed using the Hochberg procedure in the entire trial population and in the subset of patients with high FRa expression. The Hochberg procedure enables the simultaneous testing of two overlapping populations. Under this statistical analysis plan, if the p-value of the primary endpoint in either population is greater than 0.05, the p-value in the other population needs to be less than or equal to 0.025 to achieve statistical significance.

The FORWARD I trial did not meet its primary endpoint of PFS in either the entire study population or in the pre-specified subset of patients with high FRa expression.

In the FORWARD I trial, mirvetuximab was well-tolerated. The most common drug-related adverse events included nausea (46% all grades; 1% grade 3 or greater), blurred vision (42% all grades; 2% grade 3 or greater), and keratopathy (33% all grades; 1% grade 3 or greater). Although FORWARD I did not meet its primary efficacy endpoint, in an exploratory analysis using re-scoring by the PS2+ scoring method, we observed consistent and meaningful efficacy signals in the re-scored FRa-high patient population, which we believe are in line with our previous experience.

Key detailed safety and efficacy findings from FORWARD I included:

Safety: Compared with chemotherapy, mirvetuximab was associated with:

- fewer Grade ³3 treatment emergent adverse events, or TEAEs (46% vs. 61%);
- fewer dose reductions due to related TEAEs (20% vs. 31%); and
- fewer discontinuations due to related TEAEs (5% vs. 8%).

Efficacy: A significant difference in the primary endpoint of PFS was not observed in the entire study population or in the FRa -high population. Specifically,we observed the following:

- In the entire study population:
  - primary endpoint, PFS by BIRC (months): median PFS: 4.1 vs. 4.4, HR: 0.981, p-value 0.897;
  - ORR by BIRC: 22% vs. 12%, p-value 0.015; and
  - OS (as of August 2019) (months): median OS: 15.6 vs. 13.9, HR: 0.846, p-value 0.278
- In the pre-specified FRa-high population:
- primary endpoint, PFS by BIRC (months): median PFS 4.8 vs. 3.3 months, HR: 0.693, p-value 0.049 (because the p-value in the entire population was greater than 0.05, under the Hochberg

procedure, the p-value in the FRa -high population needed to be to less than or equal to 0.025 to achieve statistical significance;

- ORR by BIRC 24% vs. 10%, p-value 0.014; and
- OS (as of August 2019) (months): median OS: 16.4 vs. 12.0, HR:0.678, p-value 0.048

FORWARD I post-hoc exploratory analyses

In post hoc exploratory analyses using a PS2+ re-scoring method, in the FRa-high PS2+ re-scored population, mirvetuximab was associated with:

- longer PFS by BIRC (5.6 months vs. 3.2 months);
- higher ORR (29% vs. 6%); and
- longer OS (median OS 16.4 months vs. 11.4 months) (as of August 2019).

FORWARD I learnings from post-hoc exploratory analyses

In light of the negative outcome in the FORWARD I trial, we undertook a comprehensive assessment of the factors that may have contributed to the trial results. We believe that the outcome of FORWARD I and our subsequent exploratory analyses of the data for this trial have allowed us to better design and implement clinical trials of mirvetuximab. The following summarizes what we believe to be the key factors that contributed to the FORWARD I outcome:

- *Patient Selection.* Previous clinical trials with mirvetuximab used a PS2+ scoring method to assess tumor samples for FRa expression to determine enrollment eligibility in the trial. The PS2+ scoring method assesses both intensity of staining (0, 1+, 2+, or 3+) and percentage of tumor cells staining at each intensity, with at least 50% of cells with at least 2+ staining considered FRa medium and at least 75% of cells with at least 2+ staining considered FRa high. In preparation for potential launch of a companion diagnostic, a simplified scoring method to assess FRa expression, known as 10X scoring, was implemented for use in the FORWARD I trial. Eligibility for enrollment in FORWARD I was determined by scoring the percentage of the patient's tumor cells with positive membrane staining by £10X magnification without the need to separately assess the level of intensity of the staining. Reassessment of the FORWARD I tumor samples using the PS2+ scoring method suggests that the 10X scoring method inadvertently introduced a population of patients into FORWARD I with lower levels of FRa expression than intended and, for those patients with high levels of FRa expression upon re-scoring utilizing the PS2+ method, we observed efficacy outcomes for mirvetuximab in this post hoc exploratory analysis much more in line with our previous experience, with improved activity correlating with FRa expression and the strongest treatment effect observed in the PS2+ FRa high patient population. Based on this analysis, we will revert to PS2+ scoring for all subsequent trials.
- *Patient Population.* FORWARD I enrolled patients with both medium and high levels of FRa expression. Our exploratory analyses (including the PS2+ re-scoring) suggest that, while mirvetuximab demonstrated activity in patients with medium levels of expression, in FRa high patients, mirvetuximab compared to chemotherapy was associated with longer PFS, higher ORR, and longer OS. Accordingly, SORAYA and MIRASOL will enroll only patients with high levels of FRa expression, as assessed by the PS2+ scoring method.
- *Statistical Design.* In order to evaluate patients with medium levels of FRa expression, the statistical analysis plan for FORWARD I deployed the Hochberg procedure, with the potential need for alpha splitting when assessing the primary endpoint between the entire patient population and the subset of patients with high FRa expression. MIRASOL is designed to preserve the full alpha for the primary endpoint assessment in FRa high patients. With the benefit of data from FORWARD I (which targeted a HR of 0.58), MIRASOL is a slightly larger trial, designed with a target HR of 0.70.

With the benefit of the information obtained from these exploratory analyses, we believe that the patient selection and statistical design considerations we are implementing in MIRASOL and SORAYA will increase the likelihood of a positive outcome in these trials. Based upon the data generated to date in the

mirvetuximab development program and our discussions with the FDA, we will pursue two trials of mirvetuximab as monotherapy, either one of which we believe would support the FDA's approval of the drug candidate.

Mirvetuximab single-arm pivotal trial (SORAYA)

In December 2019, we announced that the FDA advised us that a new single-arm trial in platinum-resistant ovarian cancer could support accelerated approval for mirvetuximab, provided that ORR and DOR surpass those of the best available therapy at the time of regulatory action. The FDA further advised that prior to obtaining accelerated approval on the basis of a new single-arm trial, our planned confirmatory trial, MIRASOL, should be fully accrued. Based on this feedback, we plan to initiate SORAYA, a pivotal trial to evaluate mirvetuximab monotherapy in women with FRa-high platinum-resistant epithelial ovarian, primary or peritoneal, or fallopian tube cancer who have been previously treated with bevacizumab. SORAYA is a single-arm trial of mirvetuximab that is designed to enroll approximately 110 patients. Eligibility criteria include patients with platinum-resistant epithelial ovarian, primary or peritoneal, or fallopian tube cancer whose tumors express high levels of FRa using the PS2+ scoring method, and who have been treated with up to three prior regimens — at least one of which included bevacizumab. The primary endpoint of this trial is ORR by investigator assessment and the key secondary endpoint is DOR. We have reviewed the data generated from our previous trials with mirvetuximab, including a post hoc analysis of our Phase 3 FORWARD I trial using a PS2+ re-scoring method to assess tumor samples for FRa expression, and have identified 70 patients who we believe would have met the key eligibility criteria for SORAYA. Based on a pooled analysis of these 70 patients, the pooled ORR in these patients was 31.4% with a 95% CI (20.9%, 43.6%) and a median DOR of 7.8 months with a 95% CI (3.98, -). We believe that these data would compare favorably to the response rate seen with single agent chemotherapy in platinum resistant disease, which was 11.8% in the AURELIA trial comparing bevacizumab combined with chemotherapy versus a physician's choice of single-agent chemotherapy for platinum-resistant recurrent ovarian cancer and 12.2% in the CORAIL trial of lurbinectedin versus chemotherapy in patients with platinum-resistant ovarian cancer, both of which included patients naïve to and previously treated with bevacizumab.

We anticipate enrolling the first patient in SORAYA during the first quarter of 2020 and expect to report topline data from the trial in mid-2021. If SORAYA is successful, we expect to submit an application for accelerated approval of mirvetuximab in this patient population to the FDA during the second half of 2021.

Mirvetuximab randomized Phase 3 trial (MIRASOL)

The findings of the FORWARD I exploratory analyses have informed the design of our planned Phase 3 trial of mirvetuximab in FRa-high patients. We received feedback from FDA and the European Medicines Agency on the design of this trial, which we call MIRASOL. MIRASOL is a randomized Phase 3 trial in which approximately 430 patients will be randomized 1:1 to receive either mirvetuximab or investigator's choice of single-agent chemotherapy (weekly paclitaxel, pegylated liposomal doxorubicin, or topotecan). Eligibility criteria include patients with platinum-resistant ovarian cancer whose tumors express high levels of FRa using the PS2+ scoring method, and who have been treated with up to three prior regimens. The primary endpoint of this trial is PFS by investigator assessment. The key secondary endpoints include ORR, OS, and patient-reported outcomes using the European Organization for Research and Treatment of Cancer (EORTC) QLQ-OV28 Abdominal/GI Symptom Scale).

We have recently opened our first sites in MIRASOL and expect to report topline data from this trial in the first half of 2022. We expect this trial could serve as a confirmatory trial to SORAYA, if we receive accelerated approval on the basis of SORAYA, and that topline data from MIRASOL would be available in the first half of 2022. If successful, and if mirvetuximab receives accelerated approval on the basis of SORAYA, we believe that MIRASOL may support full approval of mirvetuximab, which could occur as early as 2023.

Mirvetuximab in combination therapy (FORWARD II)

Mirvetuximab is also being assessed in multiple combinations in FORWARD II, a Phase 1b/2 trial designed to expand the market opportunity into earlier lines of ovarian cancer through compendia listings. To date,

we have presented combination data from more than 100 patients in cohorts combining mirvetuximab with Keytruda® (pembrolizumab), Avastin® (bevacizumab), and carboplatin.

We presented mature data from the doublet cohort of mirvetuximab in combination with bevacizumab in patients with platinum-resistant epithelial ovarian cancer, primary peritoneal cancer, or fallopian tube cancer at the American Society of Clinical Oncology, or ASCO, 2019 annual meeting. We observed encouraging anti-tumor activity with a trend toward durable responses with increasing FRa expression, and favorable tolerability data, including among the subset of patients who received up to two prior lines of therapy and had medium or high levels of FRa expression. Adverse events observed with the combination were as expected based on the side effects historically observed with each agent in the combination, and no new safety signals or clinically meaningful potentiation of known toxicities were observed. Based upon these data as well as previously reported outcomes with a carboplatin doublet, we moved forward with a cohort assessing a triplet combination of mirvetuximab plus carboplatin and bevacizumab in patients with recurrent platinum-sensitive epithelial ovarian cancer, fallopian tube cancer, and primary peritoneal cancer. We completed enrollment of the triplet in late 2018 and reported initial data from this cohort at ESMO in September 2019. We believe the initial data from the triplet combination of mirvetuximab demonstrated favorable anti-tumor responses as compared to those of other carboplatin and bevacizumab-based triplet trials. The combination of full dose mirvetuximab, carboplatin and bevacizumab was well tolerated and no new safety signals were seen. Adverse events observed with the triplet were as expected based on the side effects observed with each agent, with thrombocytopenia as the most common cause of drug-related discontinuations.

In addition, to address evolving treatment paradigms, we are conducting a second mirvetuximab plus bevacizumab cohort in patients with recurrent ovarian cancer for which we completed enrollment in the third quarter of 2019. We expect to present data from this cohort in mid-2020. In addition, working with our collaborators in Germany under an investigator-sponsored protocol, we plan to initiate a randomized controlled trial in the first half of 2020 comparing the combination of mirvetuximab plus carboplatin to investigator choice platinum-based therapy in recurrent, platinum-sensitive ovarian cancer.

IMGN632 — accelerating pipeline of earlier-stage antibody-drug conjugates

We have also developed a new class of investigational indolino-benzodiazepine DNA-acting payload agents that we refer to as IGNs. Our IGNs are designed to alkylate DNA without cross-linking, which has provided a broad therapeutic index in preclinical models. Specifically, IGN ADCs have retained the anti-tumor potency of crosslinking drugs with less toxicity to normal cells in *in vitro* and animal models. These properties have allowed for repeat administration of IMGN632 in clinical studies and we believe are supported by preclinical data suggesting that IGNs may be able to be combined with other agents.

We are advancing IMGN632, our product candidate designed to target CD123, in clinical trials for patients with AML and BPDCN. We recently presented data from our Phase 1 clinical trial of IMGN632 in patients with relapsed or refractory adult AML and BPDCN. We have also determined a Phase 2 dose and schedule for IMGN632 and have initiated a clinical trial with combinations in AML as well as monotherapy in front-line patients with minimal residual disease following induction therapy. In addition, we continue to enroll BPDCN patients under our initial protocol.

Phase 1 data on IMGN632 as a monotherapy in AML and BPDCN

In December 2019, we announced that new safety and efficacy findings from the dose escalation and expansion of the ongoing first-in-human trial of IMGN632 in patients with relapsed/refractory AML and BPDCN were presented in an oral session at the American Society of Hematology, or ASH, annual meeting in December 2019. We believe that these data demonstrate the potential of IMGN632 to offer a new treatment option for patients with AML and BPDCN. With the benefit of a comprehensive assessment of IMGN632's safety and clinical effect in this Phase 1 clinical trial across a wide range of doses and two schedules, we have selected a recommended Phase 2 dose and schedule that to this point have been

associated with anti-tumor activity, favorable tolerability, and the convenience of a short infusion that can be administered in an outpatient setting.

IMGN632 was administered to 95 patients over six dose levels on the every three week schedule and over three dose levels on the fractionated schedule. IMGN632 was well-tolerated over a broad range of doses. The most common treatment-related adverse event was infusion-related reactions (24% all grades, 8% Grade 3); none required IMGN632 discontinuation. Single dose-limiting toxicities were seen at the higher dose levels tested: three reversible cases of veno-occlusive disease at greater than or equal to 0.18 mg/kg per cycle and one prolonged neutropenia at 0.3 mg/kg after two cycles. Based on the efficacy, safety, and pharmacokinetic data generated, the dose and schedule of 0.045 mg/kg given on day one every three weeks has been selected as the monotherapy recommended Phase 2 dose.

Across all dose levels and both schedules, of the AML patients assessable for clinical effect (n=71), 38 (54%) had a reduction in bone marrow blasts and 13 (18%) achieved a response, including two complete remissions, or CR, and ten with incomplete recovery, or CRi, and one morphologic leukemia free state, or MLFS, in heavily pretreated patients. The vast majority of these responders (92%) had failed prior intensive therapies, including three with prior transplant, 69% had failed two to three prior lines of therapy, and 54% had an adverse risk classification. At the dose and schedule selected as the recommended Phase 2 dose (0.045 mg/kg Q3W), a 40% response rate was seen in relapsed and refractory patients with de novo AML, including one CR, four CRi, and one MLFS (with subsequent conversion to CRi).

Of the evaluable relapsed/refractory BPDCN patients, three of nine (33%) achieved a response after one or two doses of 0.045 mg/kg IMGN632 (one CR, one CRi, and one partial remission); all three patients had received prior SL-401 (tagraxofusp-erzs), two had received intense multi-agent chemotherapy, and/or prior stem cell transplant.

Preclinical data on IMGN632 in combination therapy in AML

In addition, IMGN632 was evaluated in combination with azacitidine, and as a triplet with azacitidine and venetoclax in AML models, including patient derived xenografts, which are referred to as PDX. As reported by our collaborators from MD Anderson at ASH in December 2019, the addition of IMGN632 to azacitidine alone or to azacitidine plus venetoclax was associated with reductions in tumor burden and improved survival in these murine models. We believe that these data support clinical testing of IMGN632 in combination wth standard of care therapy including azacitidine, and azacitidine plus venetoclax in AML patients.

Ongoing IMGN632 trials

We believe that the preclinical data on combining IMGN632 with azacitidine and venetoclax generated by our MD Anderson collaborators, as well as their preclinical data on CD123 expression in acute lymphoblastic leukemia, or ALL, together with the updated clinical results reported at ASH in December 2019 provide a strong foundation for our ongoing expansion of IMGN632 monotherapy trials in BPDCN, AML and ALL, and the recent initiation of our trial to evaluate IMGN632 combinations with azacitidine and venetoclax in relapsed and frontline AML, as well as IMGN632 as a monotherapy in minimal residual disease positive AML patients.

Our preclinical programs

We continue to advance select preclinical programs, led by IMGC936. IMGC936 is an investigational ADC in co-development with MacroGenics designed to target ADAM9, an enzyme overexpressed in a range of solid tumors and implicated in tumor progression and metastasis. This ADC incorporates a number of innovations, including antibody engineering to extend half-life, site-specific conjugation with a fixed drug-antibody ratio to enable higher dosing, and a next-generation linker for improved stability and bystander activity. We reported encouraging preclinical safety and activity data from this program at the American Association of Cancer Research, or AACR, meeting in 2019 and expect MacroGenics to submit an Investigational New Drug application, or IND, for IMGC936 to the FDA in the first half of 2020. Finally, we

expect our next generation anti-folate receptor alpha candidate, IMGN151, to move into preclinical development in 2020.

Leadership in ADCs — leveraging our technology

Over the last 38 years, ImmunoGen has assembled the most comprehensive "tool box" in the ADC field. Our platform technology combines advanced chemistry and biochemistry with innovative approaches to antibody optimization, with a focus on increasing the diversity and potency of our payload agents, advancing antibody-payload linkage and release technologies, and integration of novel approaches to antibody engineering. These capabilities have enabled us to generate a pipeline of novel candidates designed for individual tumor types to have potent anti-tumor activity and favorable safety profiles that we can develop as monotherapies and in combination with existing and novel therapies.

Collaborating on ADC development with other companies allows us to generate revenue, mitigate expenses, enhance our capabilities, and extend the reach of our proprietary platform. The most advanced partner program is Roche's marketed product, Kadcyla® (ado-trastuzumab emtansine), the first ADC to demonstrate superiority over standard of care in a randomized pivotal trial, EMILIA, and gain FDA approval. Our ADC technology is also used in candidates in clinical development with a number of partners. We have evolved our partnering approach to pursue relationships where we can gain access to technology and complementary capabilities, such as our technology swap with CytomX Therapeutics, Inc., or CytomX, as well as our co-development and co-commercialization arrangements, such as our relationships with Jazz and MacroGenics. In addition, following our restructuring in 2019, we seek to monetize our remaining portfolio and platform technologies through out-licensing transactions or asset sales. To this end, in December 2019, we granted an exclusive development and commercialization license to CytomX to our cytotoxic payload technology for use with antibodies (and Probodies™ developed therefrom) directed to epithelial cell adhesion molecule (EpCAM), including certain of our proprietary anti-EpCAM antibodies developed into Probodies utilizing CytomX's Probody technology, in return for which we will receive an upfront payment from CytomX with the potential for additional payments following CytomX's successful achievement of pre-defined clinical development, approval, and commercialization milestones, as well as royalties on net sales. In addition, the new license terminated the previous exclusive development and commercialization license CytomX granted us in 2017 to its proprietary antibody-masking technology for use with Probodies.

We expect that substantially all of our revenue for the foreseeable future will result from payments under our collaborative arrangements. Descriptions of each of our significant partner agreements are included in our annual report on Form 10-K for the year ended December 31, 2018 and subsequent quarterly and current reports filed with the SEC which are incorporated by reference into this prospectus supplement — see "Incorporation of Documents by Reference" below.

Financial update

While we have not finalized our full financial results for the year ended December 31, 2019, we expect to report that we had approximately $176 million of cash and cash equivalents as of December 31, 2019. This amount is preliminary, has not been audited and is subject to change pending completion of our audited financial statements for the year ended December 31, 2019. Additional information and disclosures would be required for a more complete understanding of our financial position and results of operations as of December 31, 2019. We expect to complete our audited financial statements for the year ended December 31, 2019 subsequent to the completion of this offering. It is possible that we or our independent registered public accounting firm may identify items that require us to make adjustments to the preliminary estimated cash and cash equivalents balance set forth above and those changes could be material.

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 web site is not a part of this prospectus supplement.

The service marks, trademarks and trade names contained in this prospectus supplement, the accompanying prospectus or the documents incorporated by reference herein and therein are the property of their respective owners.

THE OFFERING

Common stock offered by us	21,325,000 shares
Option to purchase additional shares	We have granted the underwriters the option, exercisable for 30 days from the date of this prospectus supplement, to purchase up to 3,198,750 additional shares of our common stock.
Common stock to be outstanding immediately after this offering	171,012,924 shares (174,211,674 shares if the underwriters elect to exercise in full their option to purchase additional shares from us)
Use of proceeds	We intend to use the net proceeds from this offering to fund our operations, including, but not limited to, clinical trial activities, supply of drug substance and drug product, pre-commercialization activities, capital expenditures, and working capital. See "Use of Proceeds."
Risk factors	Investing in our common stock involves a high degree of risk. See "Risk Factors" for a discussion of factors that you should consider before buying shares of our common stock.
Nasdaq Global Select Market symbol	IMGN

The number of shares of common stock to be outstanding after this offering is based on 149,687,924 shares of common stock outstanding as of September 30, 2019. It does not include:

- 17,105,898 shares of our common stock issuable upon exercise of stock options outstanding as of September 30, 2019 under our stock option plans as of that date, at a weighted average exercise price of $8.08 per share;
- 293,304 shares of our common stock issuable upon redemption of deferred stock units by non-employee directors outstanding as of September 30, 2019;
- 456,000 shares of our common stock issuable upon the vesting of restricted stock units outstanding as of September 30, 2019;
- 5,779,643 shares of our common stock available as of September 30, 2019 for future grant or issuance pursuant to our stock-based plans for employees, directors and consultants;
- 472,109 shares of our common stock available as of September 30, 2019 for future issuance under our employee stock purchase plan; and
- up to 601,719 shares of our common stock that are issuable upon the conversion of $2.1 million in aggregate principal amount of our 4.50% Convertible Senior Notes due 2021 outstanding as of September 30, 2019.

Except as otherwise indicated, all information in this prospectus supplement assumes:

- no exercise by the underwriters of their option to purchase additional shares; and
- no exercise, issuance or conversion of the securities described above.

RISK FACTORS

An investment in our common stock involves a high degree of risk. Before deciding whether to invest in our common stock, you should consider carefully the risks described below and discussed under the section captioned "Risk Factors" contained in our Annual Report on Form 10-K for the year ended December 31, 2018, as filed with the SEC on March 1, 2019, which is incorporated by reference in this prospectus supplement and the accompanying prospectus in its entirety, together with other information in this prospectus supplement, the accompanying prospectus, the information and documents incorporated by reference, and in any free writing prospectus that we have authorized for use in connection with this offering. If any of these risks actually occurs, our business, financial condition, results of operation or cash flow could be seriously harmed. This could cause the trading price of our common stock to decline, resulting in a loss of all or part of your 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 to fund our operations, which may include:

- clinical trial activities;
- supply of drug substance and drug product;
- pre-commercialization activities;
- capital expenditures; 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. In addition, if our management decides to invest all or part of the net proceeds of this offering, such investments may lose all or part of their value. Our shareholders may not agree with the manner in which our management chooses to allocate and spend the net proceeds from this offering 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 21,325,000 shares of common stock in this offering, and based on the public offering price of $4.25 per share, less the underwriting discounts and commissions and estimated offering expenses payable by us, and a net tangible book deficit per share of our common stock of $(0.58) as of September 30, 2019, if you purchase shares of common stock in this offering, you will suffer immediate and substantial dilution of $4.26 per share in the net tangible book value of our common stock. If the underwriters exercise their option to purchase additional shares you will also experience dilution. See "Dilution" on page S-15 for a more detailed discussion of the dilution you will incur in connection with this offering.

In addition, we have a significant number of stock options and deferred stock units. To the extent that outstanding stock options have been or may be exercised, outstanding deferred stock units are settled, or other securities are issued, investors purchasing our common stock in this offering may experience further dilution. In addition, we may choose to raise additional capital due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. To the extent that additional capital is raised through the sale of equity or convertible debt securities, the issuance

of these securities could result in further dilution to our shareholders or result in downward pressure on the price of our common stock.

We have a limited number of authorized and unreserved shares available for future issuance, which may impair our ability to conduct future financings and other transactions.

Our restated articles of organization, as amended, currently authorizes us to issue up to 200,000,000 shares of common stock and 5,000,000 shares of preferred stock. As of December 31, 2019, we had a total of approximately 24.1 million shares of common stock that were authorized, available for future issuance and unreserved, which includes the shares of common stock that were previously reserved for issuance under our recently terminated Sales Agreement dated March 3, 2017 with Cowen and Company, LLC as sales agent. In connection with this offering, the number of shares reserved for issuance under our Inducement Equity Incentive Plan was reduced from 1,500,000 shares to 1,000,000 shares. Upon the completion of this offering, the number of authorized, unissued and unreserved shares will be reduced by the number of shares issued in this offering.

If we are unable to enter into new arrangements to issue shares of our common stock or securities convertible or exercisable into shares of our common stock because we do not have a sufficient number of authorized, unissued and unreserved shares of common stock, our ability to complete equity-based financings or other transactions that involve the potential issuance of our common stock or securities convertible or exercisable into our common stock, will be limited. In lieu of issuing common stock or securities convertible into our common stock in any future equity financing transactions, we may need to issue some or all of our authorized but unissued shares of preferred stock, which would likely have superior rights, preferences and privileges to those of our common stock, or we may need to issue debt that is not convertible into shares of our common stock, which may require us to grant security interests in our assets and property and/or impose covenants upon us that restrict our business. If we are unable to issue additional shares of common stock or securities convertible or exercisable into our common stock, our ability to enter into strategic transactions such as acquisitions of companies or technologies, may also be limited. If we propose to amend our restated articles of organization, as amended, to increase our authorized shares of common stock, such a proposal would require the approval by the holders of a majority of the shares of our common stock outstanding and entitled to vote, and we cannot assure you that such a proposal would be adopted. If we are unable to complete financing, strategic or other transactions due to our inability to issue additional shares of common stock or securities convertible or exercisable into our common stock, our financial condition and business prospects may be materially harmed.

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 supplement, the accompanying prospectus and the documents we have filed with the SEC that are incorporated by reference herein and therein contain such "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995.

Such statements in connection with any discussion of future operations or financial performance are identified by the use of words such as "may," "anticipate," "estimate," "expect," "project," "intend," "plan," "believe," and other words and terms of similar meaning. Such statements are based on management's expectations and are subject to certain factors, risks and uncertainties that may cause actual results, outcome of events, timing and performance to differ materially from those expressed or implied by such 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 their ability to develop ADCs utilizing our technology; and other factors detailed under the "Risk Factors" headings in this prospectus supplement and the accompanying prospectus, and in the discussion of risks and uncertainties under "Risk Factors" contained in our most recent Annual Report on Form 10-K, as revised or supplemented by our subsequent Quarterly Reports on Form 10-Q or our Current Reports on Form 8-K, as well as any amendments thereto, as filed with the SEC and which are incorporated herein or therein by reference. The information contained in this document is believed to be current as of the date of this document. We do not intend to update any of the forward-looking statements after the date of this document to conform these statements to actual results or to changes in our expectations, except as required by law.

In light of these assumptions, risks and uncertainties, the results and events discussed in the forward-looking statements contained in this prospectus supplement, the accompanying prospectus or in any document incorporated by reference herein or therein 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 supplement, the accompanying prospectus or the date of the document incorporated by reference in this prospectus supplement or accompanying prospectus, as the case may be. 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 estimate that the net proceeds we will receive from this offering will be approximately $84.8 million, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us, or approximately $97.6 million if the underwriters exercise their option to purchase additional shares in full.

We intend to use the net proceeds from this offering to fund our operations, including, but not limited to, clinical trial activities, supply of drug substance and drug product, pre-commercialization activities, 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. The amounts and timing of these expenditures will depend on a number of factors, such as whether and when we receive any regulatory approvals for our product candidates, our ability to enter into additional collaboration, licensing or similar transactions, the timing and progress of our research and development efforts, technological advances and the competitive environment for our product candidates. 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.

DILUTION

If you invest in this offering, your ownership interest will be diluted to the extent of the difference between the public offering price per share and the as adjusted net tangible book value (deficit) per share after giving effect to this offering. We calculate net tangible book value (deficit) per share by dividing the net tangible book value (deficit), which is tangible assets less total liabilities, by the number of outstanding shares of our common stock. Dilution represents the difference between the amount per share paid by purchasers of shares in this offering and the as adjusted net tangible book value (deficit) per share of our common stock immediately after giving effect to this offering. Our net tangible book deficit as of September 30, 2019 was approximately $(86.2) million, or $(0.58) per share.

After giving effect to the sale of shares of common stock by us at the public offering price of $4.25 per share, less the underwriting discounts and commissions and estimated offering expenses payable by us, our net tangible book deficit as of September 30, 2019 would have been $(1.4) million, or $(0.01) per share of common stock. This represents an immediate increase in the as adjusted net tangible book value of $0.57 per share to our existing shareholders and an immediate dilution of $4.26 per share to new investors.

The following table illustrates this per share dilution:

Public offering price per share		$ 4.25
Net tangible book deficit per share as of September 30, 2019	$ (0.58)	
Increase in net tangible book value per share attributable to new investors purchasing shares in this offering	0.57	
As adjusted net tangible book deficit per share as of September 30, 2019 after this offering		(0.01)
Dilution per share to new investors purchasing shares in this offering		$ 4.26

If the underwriters exercise their option to purchase additional shares in full, the as adjusted net tangible book value would increase to approximately $11.4 million, or $0.07 per share, representing an increase in net tangible book value per share to existing shareholders of approximately $0.65 per share, and there would be an immediate dilution of approximately $4.18 per share to new investors.

The above discussion and table are based on 149,687,924 shares of common stock outstanding as of September 30, 2019 and do not include:

- 17,105,898 shares of our common stock issuable upon exercise of stock options outstanding as of September 30, 2019 under our stock option plans as of that date, at a weighted average exercise price of $8.08 per share;
- 293,304 shares of our common stock issuable upon redemption of deferred stock units by non-employee directors outstanding as of September 30, 2019;
- 456,000 shares of our common stock issuable upon the vesting of restricted stock units outstanding as of September 30, 2019;
- 5,779,643 shares of our common stock available as of September 30, 2019 for future grant or issuance pursuant to our stock-based plans for employees, directors and consultants;
- 472,109 shares of our common stock available as of September 30, 2019 for future issuance under our employee stock purchase plan; and

- up to 601,719 shares of our common stock that are issuable upon the conversion of $2.1 million in aggregate principal amount of our 4.50% Convertible Senior Notes due 2021 outstanding as of September 30, 2019.

To the extent that outstanding options are exercised, outstanding deferred stock units are settled, or other securities are issued, you will experience further dilution. In addition, we may choose to raise additional capital due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. To the extent that additional capital is raised through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our shareholders.

UNDERWRITING

Subject to the terms and conditions set forth in the underwriting agreement, dated January 22, 2020, among us and Jefferies LLC, Cowen and Company, LLC and William Blair & Company, L.L.C., as the representatives of the underwriters named below and the joint book-running managers of this offering, we have agreed to sell to the underwriters, and each of the underwriters has agreed, severally and not jointly, to purchase from us the respective number of shares of common stock shown opposite its name below.

Underwriter	Number of shares
Jefferies LLC	9,240,834
Cowen and Company, LLC	7,108,333
William Blair & Company, L.L.C.	4,975,833
Total:	21,325,000

The underwriting agreement provides that the obligations of the several underwriters are subject to certain conditions precedent such as the receipt by the underwriters of officers' certificates and legal opinions and approval of certain legal matters by their counsel. The underwriting agreement provides that the underwriters will purchase all of the shares of common stock, if any of them are purchased, other than the shares of our common stock that are the subject of the option referred to below. If an underwriter defaults, the underwriting agreement provides that the purchase commitments of the non-defaulting underwriters may be increased or the underwriting agreement may be terminated. We have agreed to indemnify the underwriters and their controlling persons against certain liabilities, including liabilities under the Securities Act of 1933, as amended, or the Securities Act, and to contribute to payments that the underwriters or their controlling persons may be required to make in respect of those liabilities.

The underwriters have advised us that, following the completion of this offering, they currently intend to make a market in our common stock as permitted by applicable laws and regulations. The underwriters are not obligated to do so and may discontinue any market-making activities at any time without notice in their sole discretion. Accordingly, no assurance can be given as to the liquidity of the trading market for our common stock, that you will be able to sell any of our common stock held by you at a particular time or that the prices that you receive when you sell will be favorable.

The underwriters are offering the shares of our common stock subject to their acceptance of the shares from us and subject to prior sale. The underwriters reserve the right to withdraw, cancel or modify offers to the public and to reject orders in whole or in part.

Commissions and expenses

The underwriters have advised us that they propose to offer the shares of our common stock to the public at the public offering price set forth on the cover page of this prospectus supplement and to certain dealers, which may include the underwriters, at that price less a concession not in excess of $0.153 per share of our common stock. After the offering, the public offering price and concession to dealers may be reduced by the representatives. No such reduction shall change the amount of proceeds to be received by us as set forth on the cover page of this prospectus supplement.

The following table shows the per share and total public offering price, the underwriting discounts and commissions that we are to pay the underwriters and the proceeds, before expenses, to us in connection with this offering. Such amounts are shown assuming both no exercise and full exercise of the underwriters' option to purchase up to an additional 3,198,750 shares of common stock.

	Per share	Without exercise of option to purchase additional shares	With full exercise of option to purchase additional shares
Public offering price	$ 4.250	$ 90,631,250	$ 104,225,938
Underwriting discounts and commissions paid by us	$ 0.255	$ 5,437,875	$ 6,253,557
Proceeds to us, before expenses	$ 3.995	$ 85,193,375	$ 97,972,381

We estimate expenses payable by us in connection with this offering, other than the underwriting discounts and commissions referred to above, will be approximately $395,000. We have also agreed to reimburse the underwriters for certain expenses related to the offering in an amount up to $10,000.

Listing

Our common stock is listed on The Nasdaq Global Select Market under the symbol "IMGN."

Option to purchase additional shares

We have granted to the underwriters an option, exercisable for 30 days from the date of this prospectus supplement, to purchase, from time to time, in whole or in part, up to an aggregate of 3,198,750 shares of common stock from us at the public offering price set forth on the cover page of this prospectus supplement, less underwriting discounts and commissions. If the underwriters exercise this option, each underwriter will be obligated, subject to specified conditions, to purchase a number of additional shares of our common stock proportionate to that underwriter's initial purchase commitment as indicated in the table above.

No sales of similar securities

We and all of our directors and officers have agreed that, without the prior written consent of Jefferies LLC, Cowen and Company, LLC and William Blair & Company, L.L.C. on behalf of the underwriters, we and they will not, during the period ending 90 days after the date of this prospectus supplement (the "restricted period"):

- offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase or otherwise transfer or dispose of, directly or indirectly, any shares of common stock or any securities convertible into or exercisable or exchangeable for shares of common stock;
- file any registration statement with the SEC relating to the offering of any shares of common stock or any securities convertible into or exercisable or exchangeable for common stock; or
- enter into any swap or other arrangement that transfers to another, in whole or in part, any of the economic consequences of ownership of the common stock or such other securities;

whether any such transaction described above is to be settled by delivery of common stock or such other securities, in cash or otherwise. In addition, we and each such person agrees that, without the prior written consent of Jefferies LLC, Cowen and Company, LLC and William Blair & Company, L.L.C. on behalf of the underwriters, we or such other person will not, during the restricted period, make any demand for, or exercise any right with respect to, the registration of any shares of common stock or any security convertible into or exercisable or exchangeable for common stock.

The restrictions described in the immediately preceding paragraph do not apply to, among other things:

- the sale of shares to the underwriters;
- the issuance by us of shares of common stock upon the exercise of an option or the conversion of a security outstanding on the date of this prospectus supplement;
- the establishment of a trading plan pursuant to Rule 10b5-1 under the Securities Exchange Act of 1934, as amended, or a 10b5-1 Plan, for the transfer of shares of common stock, provided that such 10b5-1 Plan does not provide for the transfer of shares of common stock during the restricted period and no public announcement or filing under the Securities Exchange Act of 1934, as amended, or the Exchange Act, regarding the establishment of such 10b5-1 Plan shall be required or shall be voluntarily made; or
- the transfer or sale of common stock under an existing 10b5-1 Plan.

Stabilization

The underwriters have advised us that, pursuant to Regulation M under the Exchange Act, certain persons participating in the offering may engage in short sale transactions, stabilizing transactions, syndicate covering transactions or the imposition of penalty bids in connection with this offering. These activities may have the effect of stabilizing or maintaining the market price of our common stock at a level above that which might otherwise prevail in the open market. Establishing short sales positions may involve either "covered" short sales or "naked" short sales. "Covered" short sales are sales made in an amount not greater than the underwriters' option to purchase additional shares of our common stock in this offering. The underwriters may close out any covered short position by either exercising their option to purchase additional shares of our common stock or purchasing shares of our common stock in the open market. In determining the source of shares to close out the covered short position, the underwriters will consider, among other things, the price of shares available for purchase in the open market as compared to the price at which they may purchase shares through the option to purchase additional shares.

"Naked" short sales are sales in excess of the option to purchase additional shares of our common stock. The underwriters must close out any naked short position by purchasing shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the shares of our common stock in the open market after pricing that could adversely affect investors who purchase in this offering.

A stabilizing bid is a bid for the purchase of shares of our common stock on behalf of the underwriters for the purpose of fixing or maintaining the price of our common stock. A syndicate covering transaction is the bid for or the purchase of shares of our common stock on behalf of the underwriters to reduce a short position incurred by the underwriters in connection with the offering. Similar to other purchase transactions, the underwriters' purchases to cover the syndicate short sales may have the effect of raising or maintaining the market price of our common stock or preventing or retarding a decline in the market price of our common stock. As a result, the price of our common stock may be higher than the price that might otherwise exist in the open market. A penalty bid is an arrangement permitting the underwriters to reclaim the selling concession otherwise accruing to a syndicate member in connection with the offering if shares of our common stock originally sold by such syndicate member are purchased in a syndicate covering transaction and therefore have not been effectively placed by such syndicate member.

Neither we, nor any of the underwriters make any representation or prediction as to the direction or magnitude of any effect that the transactions described above may have on the price of our common stock. The underwriters are not obligated to engage in these activities, and, if commenced, any of the activities may be discontinued at any time.

The underwriters may also engage in passive market making transactions in our common stock on The Nasdaq Global Select Market in accordance with Rule 103 of Regulation M during a period before the

commencement of offers or sales of shares of our common stock in this offering and extending through the completion of distribution. A passive market maker must display its bid at a price not in excess of the highest independent bid of that security. However, if all independent bids are lowered below the passive market maker's bid, that bid must then be lowered when specified purchase limits are exceeded.

Electronic distribution

A prospectus supplement and the accompanying prospectus in electronic format may be made available by e-mail or on the web sites or through online services maintained by one or more of the underwriters or their respective affiliates. In those cases, prospective investors may view offering terms online and may be allowed to place orders online. The underwriters may agree with us to allocate a specific number of shares of common stock for sale to online brokerage account holders. Any such allocation for online distributions will be made by the underwriters on the same basis as other allocations. Other than the prospectus supplement and the accompanying prospectus in electronic format, the information on the underwriters' web sites and any information contained in any other web site maintained by any of the underwriters is not part of this prospectus supplement or the accompanying prospectus, has not been approved and/or endorsed by us or the underwriters and should not be relied upon by investors.

Other activities and relationships

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

In the ordinary course of their various business activities, the underwriters and certain of their affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (including bank loans) for their own account and for the accounts of their customers, and such investment and securities activities may involve securities and/or instruments issued by us and our affiliates. If the underwriters or their respective affiliates have a lending relationship with us, they may routinely hedge their credit exposure to us consistent with their customary risk management policies. The underwriters and their respective affiliates may hedge such exposure by entering into transactions which consist of either the purchase of credit default swaps or the creation of short positions in our securities or the securities of our affiliates, including potentially the common stock offered hereby. Any such short positions could adversely affect future trading prices of the common stock offered hereby. The underwriters and certain of their respective affiliates may also communicate independent investment recommendations, market color or trading ideas and/or publish or express independent research views in respect of such securities or instruments and may at any time hold, or recommend to clients that they acquire, long and/or short positions in such securities and instruments.

Disclaimers about non-U.S. jurisdictions

Australia

This prospectus supplement is not a disclosure document for the purposes of Australia's Corporations Act 2001 (Cth) of Australia, or Corporations Act, has not been lodged with the Australian Securities & Investments Commission and is only directed to the categories of exempt persons set out below. Accordingly, if you receive this prospectus supplement in Australia:

A. You confirm and warrant that you are either:

- a "sophisticated investor" under section 708(8)(a) or (b) of the Corporations Act;

- a "sophisticated investor" under section 708(8)(c) or (d) of the Corporations Act and that you have provided an accountant's certificate to the Company which complies with the requirements of section 708(8)(c)(i) or (ii) of the Corporations Act and related regulations before the offer has been made;
- a person associated with the Company under Section 708(12) of the Corporations Act; or
- a "professional investor" within the meaning of section 708(11)(a) or (b) of the Corporations Act.

To the extent that you are unable to confirm or warrant that you are an exempt sophisticated investor, associated person or professional investor under the Corporations Act, any offer made to you under this prospectus supplement is void and incapable of acceptance.

B. You warrant and agree that you will not offer any of the shares issued to you pursuant to this prospectus supplement for resale in Australia within 12 months of those shares being issued unless any such resale offer is exempt from the requirement to issue a disclosure document under section 708 of the Corporations Act.

Canada

A. Resale Restrictions. The distribution of the shares in Canada is being made only in the provinces of Ontario, Quebec, Alberta and British Columbia on a private placement basis exempt from the requirement that we prepare and file a prospectus with the securities regulatory authorities in each province where trades of these securities are made. Any resale of the shares in Canada must be made under applicable securities laws which may vary depending on the relevant jurisdiction, and which may require resales to be made under available statutory exemptions or under a discretionary exemption granted by the applicable Canadian securities regulatory authority. Purchasers are advised to seek legal advice prior to any resale of the securities.

B. Representations of Canadian Purchasers. By purchasing shares in Canada and accepting delivery of a purchase confirmation, a purchaser is representing to the dealer from whom the purchase confirmation is received that:

- the purchaser is entitled under applicable provincial securities laws to purchase the shares of common stock without the benefit of a prospectus qualified under those securities laws as it is an "accredited investor" as defined under National Instrument 45-106 — Prospectus Exemptions;
- the purchaser is a "permitted client" as defined in National Instrument 31-103 — Registration Requirements, Exemptions and Ongoing Registrant Obligations;
- where required by law, the purchaser is purchasing as principal and not as agent; and
- the purchaser has reviewed the text above under Resale Restrictions.

C. Conflicts of Interest. Canadian purchasers are hereby notified that the underwriters are relying on the exemption set out in section 3A.3 or 3A.4, if applicable, of National Instrument 33-105 — Underwriting Conflicts from having to provide certain conflict of interest disclosure in this document.

D. Statutory Rights of Action. Securities legislation in certain provinces or territories of Canada may provide a purchaser with remedies for rescission or damages if the prospectus supplement (including any amendment thereto) such as this document contains a misrepresentation, provided that the remedies for rescission or damages are exercised by the purchaser within the time limit prescribed by the securities legislation of the purchaser's province or territory. The purchaser of these securities in Canada should refer to any applicable provisions of the securities legislation of the purchaser's province or territory for particulars of these rights or consult with a legal advisor.

E. Enforcement of Legal Rights. All of our directors and officers as well as the experts named herein may be located outside of Canada and, as a result, it may not be possible for Canadian purchasers to effect service of process within Canada upon us or those persons. All or a substantial portion of our assets and the assets of those persons may be located outside of Canada and, as a result, it may not be possible

to satisfy a judgment against us or those persons in Canada or to enforce a judgment obtained in Canadian courts against us or those persons outside of Canada.

F. Taxation and Eligibility for Investment. Canadian purchasers of shares of common stock should consult their own legal and tax advisors with respect to the tax consequences of an investment in the company in their particular circumstances and about the eligibility of the shares of common stock for investment by the purchaser under relevant Canadian legislation.

European Economic Area

In relation to each Member State of the European Economic Area (each, an "EEA Member State"), an offer to the public of any securities which are the subject of the offering contemplated by this prospectus supplement and the accompanying prospectus may not be made in that EEA Member State except that an offer to the public in that EEA Member State of any securities may be made at any time under the following exemptions under the Prospectus Regulation:

(a) to any legal entity which is a "qualified investor" as defined in the Prospectus Regulation;

(b) to fewer than 150 natural or legal persons (other than qualified investors as defined in the Prospectus Regulation), as permitted under the Prospectus Regulation, subject to obtaining the prior consent of the underwriters or the underwriters nominated by us for any such offer; or

(c) in any other circumstances falling within Article 1(4) of the Prospectus Regulation,

provided that no such offer of securities shall require the Company or the representatives to publish a prospectus pursuant to Article 3 of the Prospectus Regulation or supplement a prospectus pursuant to Article 23 of the Prospectus Regulation,

For the purposes of this provision, the expression an "offer to the public" in relation to any securities in any EEA 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 the securities, and the expression "Prospectus Regulation" means Regulation (EU) 2017/1129.

Hong Kong

No securities have been offered or sold, and no securities may be offered or sold, in Hong Kong, by means of any document, other than to persons whose ordinary business is to buy or sell securities, whether as principal or agent; or to "professional investors" as defined in the Securities and Futures Ordinance (Cap. 571) of Hong Kong, or the SFO, and any rules made under that Ordinance; or in other circumstances which do not result in the document being a "prospectus" as defined in the Companies Ordinance (Cap. 32) of Hong Kong, or the CO, or which do not constitute an offer or invitation to the public for the purpose of the CO or the SFO. No document, invitation or advertisement relating to the securities has been issued or may be issued or may be in the possession of any person for the purpose of issue (in each case whether in Hong Kong or elsewhere), which is directed at, or the contents of which are likely to be accessed or read by, the public of Hong Kong (except if permitted under the securities laws of Hong Kong) other than with respect to securities which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" as defined in the SFO and any rules made under that Ordinance.

This prospectus supplement has not been registered with the Registrar of Companies in Hong Kong. Accordingly, this prospectus supplement may not be issued, circulated or distributed in Hong Kong, and the securities may not be offered for subscription to members of the public in Hong Kong. Each person acquiring the securities will be required, and is deemed by the acquisition of the securities, to confirm that he is aware of the restriction on offers of the securities described in this prospectus supplement and the relevant offering documents and that he is not acquiring, and has not been offered any securities in circumstances that contravene any such restrictions.

Israel

This document does not constitute a prospectus under the Israeli Securities Law, 5728-1968, or the Securities Law, and has not been filed with or approved by the Israel Securities Authority. In Israel, this prospectus is being distributed only to, and is directed only at, and any offer of the shares of common stock is directed only at, (i) a limited number of persons in accordance with the Israeli Securities Law and (ii) investors listed in the first addendum, or the Addendum, to the Israeli Securities Law, consisting primarily of joint investment in trust funds, provident funds, insurance companies, banks, portfolio managers, investment advisors, members of the Tel Aviv Stock Exchange, underwriters, venture capital funds, entities with equity in excess of NIS 50 million and "qualified individuals," each as defined in the Addendum (as it may be amended from time to time), collectively referred to as qualified investors (in each case, purchasing for their own account or, where permitted under the Addendum, for the accounts of their clients who are investors listed in the Addendum). Qualified investors are required to submit written confirmation that they fall within the scope of the Addendum, are aware of the meaning of same and agree to it.

Japan

This offering has not been and will not be registered under the Financial Instruments and Exchange Law of Japan (Law No. 25 of 1948 of Japan, as amended), or FIEL, and the Initial Purchaser will not offer or sell any securities, directly or indirectly, in Japan or to, or for the benefit of, any resident of Japan (which term as used herein means any person resident in Japan, including any corporation or other entity organized under the laws of Japan), or to others for re-offering or resale, directly or indirectly, in Japan or to, or for the benefit of, any resident of Japan, except pursuant to an exemption from the registration requirements of, and otherwise in compliance with, the FIEL and any other applicable laws, regulations and ministerial guidelines of Japan.

Singapore

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

Where the shares of common stock are subscribed or purchased under Section 275 of the SFA by a relevant person which is:

(a) a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or

(b) a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor, securities (as defined in Section 239(1) of the SFA) of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the securities pursuant to an offer made under Section 275 of the SFA except:

(i) to an institutional investor or to a relevant person defined in Section 275(2) of the SFA, or to any person arising from an offer referred to in Section 275(1A) or Section 276(4)(i)(B) of the SFA;

(ii) where no consideration is or will be given for the transfer;

(iii) where the transfer is by operation of law;

(iv) as specified in Section 276(7) of the SFA; or

(v) as specified in Regulation 32 of the Securities and Futures (Offers of Investments) (Shares and Debentures) Regulations 2005 of Singapore.

Switzerland

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

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

United Kingdom

This prospectus supplement is only being distributed to, and is only directed at, persons in the United Kingdom that are qualified investors within the meaning of Article 2(1)(e) of the Prospectus Directive that are also (i) investment professionals falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, as amended, or the Order, and/or (ii) high net worth entities falling within Article 49(2)(a) to (d) of the Order and other persons to whom it may lawfully be communicated (each such person being referred to as a relevant person).

This prospectus supplement and its contents are confidential and should not be distributed, published or reproduced (in whole or in part) or disclosed by recipients to any other persons in the United Kingdom. Any person in the United Kingdom that is not a relevant person should not act or rely on this document or any of its contents.

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 will act as counsel to the underwriters in connection with this offering.

EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2018, and the effectiveness of our internal control over financial reporting as of December 31, 2018, as set forth in their reports thereon, which are incorporated by reference in this prospectus supplement and elsewhere in the registration statement. Our financial statements are incorporated by reference in reliance on Ernst & Young LLP's 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. SEC filings are available at the SEC's web site at http://www.sec.gov.

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 omit 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.

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.

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 year ended December 31, 2018 filed on March 1, 2019;
- our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2019, June 30, 2019 and September 30, 2019 filed on May 7, 2019, August 7, 2019 and November 5, 2019, respectively;
- our Current Reports on Form 8-K (and amendments thereto) filed on January 8, 2019, March 1, 2019, May 15, 2019, June 24, 2019, June 27, 2019, August 5, 2019, September 30, 2019, November 26, 2019, December 17, 2019, December 20, 2019 and January 22, 2020 (in each case, except for information contained therein which is furnished rather than filed);
- the portions of our definitive proxy statement on Schedule 14A filed on April 30, 2019 that are deemed "filed" with the SEC under the Securities Exchange Act of 1934, as amended;
- 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 of the filings that we make pursuant to the Securities Exchange Act of 1934, as amended, until all of the securities to which this prospectus supplement relates have been sold or the offering is otherwise terminated, except in each case 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, which filings will be deemed to be incorporated by reference in this prospectus supplement and to be a part hereof from the date of filing of such 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.

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PROSPECTUS

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, any combination of the securities 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. In addition, this prospectus may be used to offer securities for the account of persons other than us. We will provide you with specific terms of any offering in one or more supplements to this prospectus. This prospectus may not be used to offer or sell our securities unless accompanied by a prospectus supplement. 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 Select Market under the symbol "IMGN." On March 6, 2018, the last reported sale price of our common stock was $11.33 per share. 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 4 of this prospectus under the caption "Risk Factors." We may include specific risk factors in supplements to this prospectus under the caption "Risk Factors."

Our securities may be sold directly to investors, through agents designated from time to time or to or through underwriters or dealers. If any underwriters or agents are involved in the sale of our securities with respect to which this prospectus is being delivered, the names of such underwriters or agents 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 March 7, 2018.

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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, 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, may be offered in one or more offerings. This prospectus provides you with a general description of the securities that may be offered. Each time a type or series of securities is offered 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.

Our trademarks include, without limitation, our name and corporate logo. Other service marks, trademarks and trade names contained in this prospectus, any prospectus supplement or the documents incorporated by reference herein and therein are the property of their respective owners.

PROSPECTUS SUMMARY

The following is a summary 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.

We are a clinical-stage biotechnology company focused on developing innovative antibody-drug conjugate, or ADC, therapies that meaningfully improve the lives of people with cancer. An ADC with our proprietary technology comprises an antibody that binds to a target found on tumor cells and is conjugated to one of our potent anti-cancer agents as a "payload" to kill the tumor cell once the ADC has bound to its target. ADCs are an expanding approach to the treatment of cancer, with four approved products and the number of agents in development growing significantly in recent years.

We have established a leadership position in ADCs. Our proprietary portfolio is led by mirvetuximab soravtansine, a first-in-class ADC targeting folate-receptor alpha, or FRá. In late 2016, we initiated a Phase 3 registration trial, FORWARD I, with mirvetuximab soravtansine for use as single-agent therapy to treat patients with platinum-resistant ovarian cancer whose tumors express medium or high levels of FRá and who have received up to three prior treatment regimens. In June 2017, we reported data on 113 ovarian cancer patients treated with mirvetuximab soravtansine from three Phase 1 expansion cohorts. From this pooled analysis, in the subset of 36 patients meeting the key eligibility criteria for FORWARD I, the confirmed overall response rate, or ORR, was 47 percent (95% CI 30, 65) and median progression-free survival, or mPFS, was 6.7 months (95% CI 4.1, 8.3). The safety profile of this pooled population was consistent with data previously reported (ASCO 2016), consisting of low grade, manageable adverse events. The Phase 3 FORWARD I trial is ongoing with sites enrolling in the U.S., Canada and Europe and we expect the trial to enroll fully by mid-2018.

Additionally, we are accruing patients in a companion study, FORWARD II, to evaluate mirvetuximab soravtansine in combination regimens to expand the number of patients with ovarian cancer eligible for treatment with the ADC. FORWARD II consists of cohorts assessing mirvetuximab soravtansine in combination with, in separate doublets, Avastin® (bevacizumab), pegylated liposomal doxorubicin, or PLD, carboplatin, and Keytruda® (pembrolizumab). Based on the encouraging profile of these combinations, we have advanced expansion cohorts for the Avastin and Keytruda combinations in patients with platinum-resistant disease and have recently initiated a triplet combination evaluating mirvetuximab plus carboplatin and Avastin in patients with recurrent platinum-sensitive ovarian cancer. We reported the first clinical data from FORWARD II in June 2017 demonstrating that mirvetuximab soravtansine may complement currently available therapies in a range of treatment settings, including earlier lines of therapy. We expect to report additional data from FORWARD II during 2018.

We have built a productive platform that continues to generate innovative and proprietary ADCs, including IMGN779, our CD33-targeting product candidate for acute myeloid leukemia, or AML. IMGN779 combines a high-affinity, humanized anti-CD33 antibody with one of our novel indolino-benzodiazepine payloads, called IGNs, which alkylate DNA without crosslinking, resulting in potent anti-leukemia activity with relative sparing of normal hematopoietic progenitor cells. We reported clinical data from this trial in December 2017 demonstrating IMGN779 is well tolerated with no dose limiting toxicities and that IMGN779 has dose-dependent biological and anti-leukemia activity.

IMGN779 is progressing through dose escalation in a Phase 1 trial in AML. We also are advancing IMGN632, a CD123-targeting ADC that uses an even more potent IGN payload agent with a new engineered linker and novel antibody, which we are developing for hematological malignancies, including AML and blastic plasmacytoid dendritic cell neoplasm (BPDCN). In January 2018, we announced that the first patient had been dosed in the Phase 1 trial of IMGN632.

In August 2017, we announced a strategic collaboration and option agreement with Jazz Pharmaceuticals plc, or Jazz, to develop and co-commercialize ADCs. Jazz has exclusive worldwide rights to opt into development and commercialization of IMGN779, IMGN632, and a third program to be named later from our early-stage pipeline.

Collaborating on ADC development with other companies allows us to generate revenue, mitigate expenses, enhance our capabilities and extend the reach of our proprietary platform. The most advanced partner program is Roche's marketed product, Kadcyla® (ado-trastuzumab emtansine), the first ADC to demonstrate superiority over standard of care in a randomized pivotal trial, EMILIA, and gain FDA approval. Our ADC platform is used in candidates in clinical development with Amgen, Bayer, Biotest, CytomX, Debiopharm, Lilly, Novartis, and Sanofi. We also have a partnership with Takeda, and expect they will advance their first candidate with our ADC technology deploying our IGN payload into clinical testing for solid tumors in the first half of 2018. We expect that substantially all of our revenue for the foreseeable future will result from payments under our collaborative arrangements.

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.

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.

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," "tracking" 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 their ability to develop ADCs utilizing our technology 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.

RATIO OF EARNINGS TO FIXED CHARGES

The following table sets forth our historical ratios of earnings to fixed charges for the periods indicated. You should read this table in conjunction with the financial statements and notes incorporated by reference in this prospectus.

In thousands	Year Ended December 31, 2017	Transition Period Ended December 31, 2016	Year Ended June 30, 2016	2015	2014	2014
Ratio of earnings to fixed charges(1)	—	—	—	—	—	—

(1) Earnings were inadequate to cover fixed charges for the year ended December 31, 2017, the six-month transition period ended December 31, 2016 and the years ended June 30, 2016, 2015, 2014 and 2013 by $96.0 million, $78.9 million, $144.8 million, $60.7 million, $71.4 million and $72.8 million respectively.

USE OF PROCEEDS

Except as provided in the applicable prospectus supplement, we intend to use the net proceeds from the sale of the securities by us through this prospectus for general corporate purposes. Except as provided in the applicable prospectus supplement, we will not receive any proceeds in the event that securities are sold by a selling securityholder. Additional information on the use of net proceeds from the sale of securities covered by this prospectus may be set forth in the prospectus supplement relating to the specific offering.

DESCRIPTION OF COMMON STOCK

We are authorized to issue 200,000,000 shares of common stock, par value $.01 per share. On February 28, 2018, we had 132,846,535 shares of common stock outstanding and approximately 344 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 Broadridge Corporate Issuer Solutions, Inc.

The Nasdaq Global Select Market

Our common stock is listed for quotation on The Nasdaq Global Select Market under the symbol "IMGN." On March 6, 2018, the last reported sale price of our common stock was $11.33 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 March 6, 2018, 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 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 a specific series of preferred stock is offered 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.

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 may be offered under this prospectus. While the terms we have summarized below will apply generally to any future debt securities that may be offered pursuant to this prospectus, we will describe the particular terms of any debt securities that may be offered in more detail in the applicable prospectus supplement. If we so indicate in a prospectus supplement, the terms of any debt securities offered 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.

Under this prospectus, debt securities, which may be senior or subordinated, may be sold from time to time, in one or more offerings. 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;

- 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.

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

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

- 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

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.

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

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 may be offered, as described in the applicable prospectus supplement. Below is a description of certain general terms and provisions of the warrants that may be offered. 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 the warrants will be issued;
- 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;

- 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

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 may be offered. 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 being offered 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.

SELLING SECURITYHOLDERS

Selling securityholders are persons or entities that, directly or indirectly, have acquired or will from time to time acquire, securities in various private or other transactions. Such selling securityholders may be parties to registration rights agreements with us, or we otherwise may have agreed or will agree to register their securities for resale. The purchasers of our securities, as well as their transferees, pledges, donees or successors, all of whom we refer to as "selling securityholders," may from time to time offer and sell the securities pursuant to this prospectus and any applicable prospectus supplement. The applicable prospectus supplement will set forth the name of each of the selling securityholders and the number of shares of our common stock or other relevant securities beneficially owned by such selling securityholders that are covered by such prospectus supplement.

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, which is referred to as "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 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.

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

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2017, and the effectiveness of our internal control over financial reporting as of December 31, 2017, as set forth in their reports, which are incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements are incorporated by reference in reliance on Ernst & Young LLP's reports, given on their authority 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 Select 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 December 31, 2017 filed on March 7, 2018;
- our Current Reports on Form 8-K filed on January 24, 2018, February 8, 2018 and February 20, 2018;
- the portions of our definitive proxy statement on Schedule 14A filed on April 28, 2017 that are deemed "filed" with the SEC under the Securities Exchange Act of 1934, as amended;
- 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; and
- all of the filings that we make pursuant to the Securities Exchange Act of 1934, as amended, (1) after the date of the filing of the original registration statement and prior to the effectiveness of the registration statement and (2) until all of the securities to which this prospectus relates has been sold or the offering is otherwise terminated, except in each case 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, which filings will be deemed to be incorporated by reference in this prospectus and to be a part hereof from the date of filing of such documents.

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, before the date any offering under this prospectus 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

21,325,000 Shares

Common stock

Prospectus supplement

Joint Book-Running Managers

Jefferies

Cowen

William Blair

January 22, 2020