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

FORM 10-K/A
Amendment No. 1

(Mark One)

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

For the Fiscal Year Ended December 31, 2019

or

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

For the transition period from to
Commission file number 001-10865

AMAG PHARMACEUTICALS, INC.
(Exact Name of Registrant as Specified in Its Charter)

Delaware	**04-2742593**
(State or Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification No.)
1100 Winter Street, Waltham, Massachusetts	**02451**
(Address of Principal Executive Offices)	(Zip Code)

(617) 498-3300
(Registrant's Telephone Number, Including Area Code)

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, par value $0.01 per share	**AMAG**	**NASDAQ Global Select Market**
Preferred Share Purchase Rights		

Securities registered pursuant to Section 12(g) of the Act: **None**

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

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

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

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). **Yes** ☒ **No** ☐

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

Large accelerated filer	☐	Accelerated filer	☒
Non-accelerated filer	☐	Smaller reporting company	☐
		Emerging growth company	☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). **Yes** ☐ **No** ☒

The aggregate market value of the registrant's voting stock held by non-affiliates as of June 28, 2019 was approximately $335.0 million based on the closing price of $9.99 of the Common Stock of the registrant as reported on the NASDAQ Global Select Market on such date. As of March 2, 2020, there were 34,265,738 shares of the registrant's Common Stock, par value $0.01 per share, outstanding.

EXPLANATORY NOTE

AMAG Pharmaceuticals, Inc (the "Company" or "we") is filing this Amendment No. 1 on Form 10-K/A (this "Amendment") to amend and restate certain items in its Annual Report on Form 10-K for the year ended December 31, 2019, originally filed with the U.S. Securities and Exchange Commission (the "SEC") on March 6, 2020 (the "Original 10-K").

As previously disclosed, including in the Company's Current Report on Form 8-K filed with the SEC on August 17, 2020, the Company identified immaterial errors in its previously reported revenue for Makena® (hydroxyprogesterone caproate injection) that overstated revenues by approximately $6.3 million in the aggregate over the impacted annual periods of 2016 through 2019 and understated revenue as previously reported in the three month period ended March 31, 2020 by approximately $1.8 million and, in connection therewith, the Company's management identified a material weakness in its internal control over financial reporting ("ICFR") related to ensuring the timely recognition of its gross-to-net adjustments for certain governmental rebates and the related accruals. Specifically, the Company did not design and maintain controls to allow for an effective review of disputed claims related to certain government rebate arrangements, where the decision had been made to initially not record and accrue for such items, to assess whether and when the need to record an accrual is required for such claims. Also, as previously disclosed, management determined that its report regarding the effectiveness of the Company's ICFR contained in the Original 10-K, and PricewaterhouseCoopers LLP ("PwC"), the Company's independent registered accounting firm as of December 31, 2019, have determined its opinion relating to the effectiveness of the Company's ICFR as of December 31, 2019 included in the Original 10-K, should not be relied upon.

Accordingly, this Amendment is being filed to amend Item 6, Selected Financial Data, Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations, Item 8, Financial Statements and Supplementary Data, and Item 9A, Controls and Procedures, of Part II of the Original 10-K and to revise the financial statements and related notes to reflect the correction of the immaterial errors identified, and to restate Management's Annual Report on Internal Control Over Financial Reporting, management's assessment of the effectiveness of our disclosure controls and procedures and PwC's Report of Independent Registered Public Accounting Firm on the Company's internal control over financial reporting. Additionally, in accordance with Rule 12b-15 under the Securities Exchange Act of 1934, as amended, the Company is including with this Amendment currently dated certifications as Exhibits 31.1, 31.2, 32.1 and 32.2 and Item 15 of Part IV of the Original 10-K is accordingly replaced with the Item 15 included herein.

Except as described above, this Amendment does not amend, update or change any other disclosures in the Original Form 10-K. In addition, the information contained in this Amendment does not reflect events occurring after the filing of the Original 10-K and does not modify or update the disclosures therein, except as specifically identified above. Significant developments with respect to those disclosures, as well as other changes in and risks to our business, have occurred and are described in filings we have made with the SEC subsequent to filing the Original 10-K, including our Quarterly Report on Form 10-Q for the three and six months ended June 30, 2020, which further describes the impact of the material weakness. Accordingly, this Amendment should be read in conjunction with the Company's filings made with the SEC subsequent to the filing of the Original 10-K, including the information contained under the heading "Risk Factors," or otherwise identified as risks to the Company and its operations, in such filings.

AMAG PHARMACEUTICALS, INC.
FORM 10-K
FOR THE YEAR ENDED DECEMBER 31, 2019
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PART II

ITEM 6. SELECTED FINANCIAL DATA:

The following table sets forth selected financial data as of and for the years ended December 31, 2019, 2018, 2017, 2016 and 2015. The selected financial data set forth below has been derived from our audited financial statements. This information should be read in conjunction with the financial statements and the related notes thereto included in Part II, Item 8 of this Annual Report on Form 10-K/A and Management's Discussion and Analysis of Financial Condition and Results of Operations included in Part II, Item 7 of this Annual Report on Form 10-K/A. Our consolidated financial statements as of December 31, 2019 and 2018, and for the years ended December 31, 2019, 2018 and 2017, have been revised to correct prior period errors as discussed in Note X, *"Revision of Prior Period Financial Statements"* to our consolidated financial statements included in this Annual Report on Form 10-K/A. Accordingly, this selected financial data reflects the impact of those revisions. The tables below are also revised to reflect the correction of the related immaterial prior period errors as of and for the year ended December 31, 2016. There was no impact to 2015 as a result of these prior period errors.

	Years Ended December 31,				
	2019	2018	2017	2016	2015
	(in thousands, except per share data)				
Statements of Operations Data					
Continuing Operations:					
Revenues:					
Product sales, net	$ 309,985	$ 471,898	$ 493,843	$ 430,828	$ 341,816
Collaboration revenue [1]	16,400	—	—	—	51,050
Other revenues	161	150	124	317	1,278
Total revenues	326,546	472,048	493,967	431,145	394,144
Costs and expenses:					
Cost of product sales [2]	107,193	215,892	161,349	96,314	78,509
Research and development expenses	64,853	44,846	75,017	65,561	42,710
Acquired in-process research and development [3]	74,856	32,500	65,845	—	—
Selling, general and administrative expenses [4]	286,600	227,810	178,151	169,468	131,127
Impairment of assets [5]	232,336	—	319,246	15,724	—
Acquisition-related costs	—	—	—	—	11,232
Restructuring expenses	7,420	—	—	341	2,274
Total costs and expenses	773,258	521,048	799,608	347,408	265,852
Operating (loss) income	(446,712)	(49,000)	(305,641)	83,737	128,292
Other income (expense):					
Interest expense	(25,709)	(51,971)	(68,382)	(73,153)	(53,251)
Loss on debt extinguishment [6]	—	(35,922)	(10,926)	—	(10,449)
Interest and dividend income	4,285	5,328	2,810	3,149	1,501
Other income (expense)	428	(74)	(70)	189	(9,173)
Total other expense	(20,996)	(82,639)	(76,568)	(69,815)	(71,372)
(Loss) income from continuing operations before income taxes	(467,708)	(131,639)	(382,209)	13,922	56,920
Income tax (benefit) expense [7]	(47)	40,436	(175,521)	12,656	12,764
Net (loss) income from continuing operations	$ (467,661)	$ (172,075)	$ (206,688)	$ 1,266	$ 44,156
Discontinued operations:					
Income (loss) from discontinued operations	$ —	$ 18,873	$ 10,313	$ (6,209)	$ (17,076)
Gain on sale of CBR business	—	87,076	—	—	—
Income tax expense (benefit)	—	2,371	4,388	(1,633)	(5,699)
Net income (loss) from discontinued operations	$ —	$ 103,578	$ 5,925	$ (4,576)	$ (11,377)

Net (loss) income	$ (467,661)	$ (68,497)	$ (200,763)	$ (3,310)	$ 32,779
Basic earnings per share:					
(Loss) income from continuing operations	$ (13.74)	$ (5.00)	$ (5.92)	$ 0.04	$ 1.40
Income (loss) from discontinued operations	—	3.01	0.17	(0.13)	(0.36)
Total	$ (13.74)	$ (1.99)	$ (5.75)	$ (0.09)	$ 1.04
Diluted earnings per share:					
(Loss) income from continuing operations	$ (13.74)	$ (5.00)	$ (5.92)	$ 0.04	$ 1.25
Income (loss) from discontinued operations	—	3.01	0.17	(0.13)	(0.32)
Total	$ (13.74)	$ (1.99)	$ (5.75)	$ (0.09)	$ 0.93
Weighted average shares outstanding used to compute earnings per share:					
Basic	34,030	34,394	34,907	34,346	31,471
Diluted	34,030	34,394	34,907	34,833	35,308

	December 31,				
	2019	2018	2017	2016	2015
Balance Sheet Data					
Cash, cash equivalents and marketable securities	$ 171,751	$ 394,171	$ 299,448	$ 527,130	$ 456,359
Working capital (current assets less current liabilities)	$ 102,070	$ 354,628	$ 201,006	$ 404,339	$ 360,753
Total assets [8]	$ 791,227	$ 1,175,459	$ 1,901,138	$ 2,478,426	$ 2,476,210
Long-term liabilities [9]	$ 296,914	$ 263,360	$ 832,394	$ 1,230,645	$ 1,298,025
Stockholders' equity	$ 279,816	$ 741,557	$ 787,882	$ 933,562	$ 932,264

(1) In 2019, we recognized $16.4 million in collaboration revenue associated with the termination of a clinical trial collaboration agreement with a pharmaceutical company that we acquired in connection with the Perosphere transaction. In 2015, we recognized $44.4 million in revenues associated with the amortization of the then remaining deferred revenue balance as a result of the termination of a license, development and commercialization agreement (the "Takeda Termination Agreement") with Takeda Pharmaceutical Company Limited ("Takeda") and $6.7 million of additional revenues related to payments made by Takeda upon the final termination date under the terms of the Takeda Termination Agreement.

(2) Cost of product sales in 2019, 2018, 2017, 2016, and 2015 included approximately $24.8 million, $158.4 million, $130.4 million, $77.8 million, and $63.3 million, respectively, of non-cash expense related to the amortization of intangible assets and the step-up of Lumara Health's inventories at the acquisition date.

(3) 2019 reflects $74.9 million related to our acquisition of Perosphere. 2018 reflects $12.5 million paid in connection with our acquisition of AMAG-423 and $20.0 million paid to Palatin upon FDA acceptance of the Vyleesi NDA. 2017 reflects $65.8 million related to a $60.0 million one-time upfront payment under the terms of the Palatin License Agreement and $5.8 million, which represented a portion of the consideration recorded in 2017 under the terms of the Endoceutics License Agreement.

(4) 2019, 2018 and 2017 reflect increases driven by organizational growth associated with significant launch activities for multiple products and costs related to the commercialization of Intrarosa and Vyleesi. 2016 reflects an increase in the Makena-related contingent consideration based on the expected timing of milestone payments.

(5) In 2019, we recognized $232.3 million of charges related to the impairments of the asset groups containing the Makena base technology, Makena auto-injector developed technology, Intrarosa developed technology and Vyleesi developed technology driven by (i) the discontinuation of the Makena IM products, (ii) the unfavorable FDA Advisory Committee

recommendation for Makena and (iii) our intention to divest Intrarosa and Vyleesi based on the strategic review that we conducted. In 2017, we recognized a $319.2 million impairment charge related to the Makena base technology intangible asset. In 2016, we recognized $15.7 million of charges related to the impairment of the remaining net intangible asset related to MuGard.

(6) Reflects $35.9 million, $10.9 million and $10.4 million loss on debt extinguishment in 2018, 2017 and 2015, respectively, due to the early redemption of a $500.0 million aggregate principal amount of 7.875% Senior Notes due 2023 (the "2023 Senior Notes"), the early repayment of a 2015 term loan facility and the early repayment of a 2014 term loan facility, respectively.

(7) The $175.5 million income tax benefit in 2017 was primarily driven by the deferred tax benefit related to the Makena base technology intangible asset impairment and amortization.

(8) Reflects the impact of aggregate asset impairment charges of $232.3 million in 2019, the sale of the Cord Blood Registry business in 2018 and the $319.2 million impairment charge related to the Makena base technology intangible asset in 2017.

(9) Long-term liabilities decreased in 2018 and 2017 primarily due to the repayment of our 2023 Senior Notes and 2015 term loan facility, respectively.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS:

Overview

AMAG Pharmaceuticals, Inc., a Delaware corporation, was founded in 1981. We are a pharmaceutical company focused on bringing innovative products to patients with unmet medical needs by leveraging our development and commercial expertise to invest in and grow our pharmaceutical products and product candidates across a range of therapeutic areas. Our currently marketed products support the health of patients in the areas of hematology and maternal and women's health, including Feraheme® (ferumoxytol injection) for intravenous ("IV") use, Makena® (hydroxyprogesterone caproate injection) auto-injector, Intrarosa® (prasterone) vaginal inserts and Vyleesi®(bremelanotide injection). In addition to our approved products, our portfolio includes two product candidates, AMAG-423 (digoxin immune fab (ovine)), which is being studied for the treatment of severe preeclampsia, and ciraparantag, which is being studied as an anticoagulant reversal agent.

In January 2020, we announced that we had recently completed a review of our product portfolio and strategy with the objective of driving near- and long-term profitability and enhancing shareholder value. Based on this strategic review, we are currently pursuing options to divest Intrarosa and Vyleesi. In addition, we announced that William Heiden will be stepping down as our President and Chief Executive Officer. We expect that Mr. Heiden will remain at the company until the Board of Directors (the "Board") appoints a new Chief Executive Officer.

We intend to continue to expand the impact of our current and future products for patients by delivering on our growth strategy, which includes collaborating on and acquiring promising therapies at various stages of development, and advancing them through the clinical and regulatory process to deliver new treatment options to patients. Our primary sources of revenue in 2019 were from sales of Feraheme, Makena and Intrarosa. Except as otherwise stated below, the following discussions of our results of operations reflect the results of our continuing operations, excluding the results related to the Cord Blood Registry (the "CBR business"), which we sold in August 2018. The CBR business has been separated from continuing operations and reflected as a discontinued operation. See Note C, "*Discontinued Operations,*" to our consolidated financial statements included in this Annual Report on Form 10-K.

The consolidated financial statements as of December 31, 2019 and 2018, and for the years ended December 31, 2019, 2018 and 2017 have been revised to correct prior period errors as discussed in Note X, *"Revision of Prior Period Financial Statements"* to our consolidated financial statements included in this Annual Report on Form 10-K/A. Accordingly, Management's Discussion and Analysis reflects the impact of those revisions.

AMAG's Portfolio of Products and Product Candidates

Feraheme

Feraheme received approval from the U.S. Food and Drug Administration (the "FDA") in June 2009 for use as an IV iron replacement therapy for the treatment of iron deficiency anemia ("IDA") in adult patients with chronic kidney disease ("CKD"). In February 2018, the FDA approved the supplemental New Drug Application to expand the Feraheme label to

include all eligible adult IDA patients who have intolerance to oral iron or have had unsatisfactory response to oral iron in addition to patients who have CKD. IDA is prevalent in many different patient populations, such as patients with CKD, gastrointestinal diseases or disorders, inflammatory diseases, and chemotherapy-induced anemia. For many of these patients, treatment with oral iron is unsatisfactory or is not tolerated. It is estimated that approximately five million people in the U.S. have IDA and we estimate that a small fraction of the patients who are diagnosed with IDA regardless of the underlying cause are currently being treated with IV iron.

The expanded Feraheme label was supported by two positive pivotal Phase 3 trials, which evaluated Feraheme versus iron sucrose or placebo in a broad population of patients with IDA and positive results from a third Phase 3 randomized, double-blind non-inferiority trial that evaluated the incidence of moderate-to-severe hypersensitivity reactions (including anaphylaxis) and moderate-to-severe hypotension with Feraheme compared to Injectafer® (ferric carboxymaltose injection) (the "Feraheme comparator trial"). The Feraheme comparator trial demonstrated comparability to Injectafer® based on the primary composite endpoint of the incidence of moderate-to-severe hypersensitivity reactions (including anaphylaxis) and moderate-to-severe hypotension (Feraheme incidence 0.6%; Injectafer® incidence 0.7%). Adverse event rates were similar across both treatment groups; however, the incidence of severe hypophosphatemia (defined by blood phosphorous of <0.2 mg/dl at week 2) was less in the patients receiving Feraheme (0.4% of patients) compared to those receiving Injectafer® (38.7% of patients).

Makena

We acquired the rights to Makena in connection with our acquisition of Lumara Health Inc. ("Lumara Health") in November 2014. Makena is indicated to reduce the risk of preterm birth in women pregnant with a single baby who have a history of singleton spontaneous preterm birth.

Makena was approved by the FDA in February 2011 as an intramuscular ("IM") injection (the "Makena IM product") packaged in a multi-dose vial and in February 2016 as a single-dose preservative-free vial. In February 2018, the Makena auto-injector was approved by the FDA for administration via a pre-filled subcutaneous auto-injector, a drug-device combination product (the "Makena auto-injector"). In mid-2018, we launched our own authorized generic of both the single- and multi-dose vials (the "Makena authorized generic") through Prasco, LLC ("Prasco"). As previously disclosed, based on manufacturing challenges and increased generic competition we no longer offer a branded IM product of Makena and in August 2019 we and Prasco determined it was not commercially viable to continue the relationship and mutually terminated our distribution and supply agreement, such that we no longer offer the Makena authorized generic. Further, as a result of the loss of substantial market share for the Makena IM product, in the second quarter of 2019 we revised our long-term Makena IM products forecast resulting in the recording of significant impairment charges related to the Makena IM products, as discussed in Note I, *"Goodwill and Intangible Assets, Net"* to the consolidated financial statements included in this annual report on Form 10-K.

In March 2019, we announced topline results from the Progestin's Role in Optimizing Neonatal Gestation clinical trial ("PROLONG" or "Trial 003"), a randomized, double-blinded, placebo-controlled clinical trial evaluating Makena in patients with a history of a prior spontaneous singleton preterm delivery. The PROLONG trial was conducted under the FDA's "Subpart H" accelerated approval process. The approval of Makena was based primarily on the Meis trial ("Trial 002"), which was conducted by the Maternal-Fetal Medicine Units Network, sponsored by the National Institute of Child Health and Human Development. In contrast to the Meis trial, the PROLONG trial did not demonstrate a statistically significant difference between the treatment and placebo arms for the co-primary endpoints: the incidence of preterm delivery at less than 35 weeks (Makena treated group 11.0% vs. placebo 11.5%) and the percentage of patients who met criteria for the pre-specified neonatal morbidity and mortality composite index (Makena treated group 5.6% vs. placebo 5.0%). The adverse event profile between the two arms was comparable. Adverse events of special interest, including miscarriage and stillbirth, were infrequent and similar between the treatment and placebo groups. The PROLONG trial enrolled 1,708 pregnant women, over 75% of whom were enrolled outside the U.S.

On October 29, 2019, the FDA's Bone, Reproductive and Urologic Drugs Advisory Committee (the "Advisory Committee") met to discuss the results of the PROLONG trial to inform the FDA's regulatory decision for Makena. Following various presentations by experts and discussions at the meeting, the Advisory Committee voted as follows: (a) in response to the question "Do the findings from Trial 003 verify the clinical benefits of Makena on neonatal outcomes?", 16 members voted "No" and no members voted "Yes"; (b) in response to the question "Based on the findings from Trial 002 and Trial 003, is there substantial evidence of effectiveness of Makena in reducing the risk of recurrent preterm birth?", 13 members voted "No" and three members voted "Yes"; and (c) in response to the question, "Should the FDA (A) pursue withdrawal of approval for Makena, (B) leave Makena on the market under accelerated approval and require a new confirmatory trial, or (C) leave Makena on the market without requiring a new confirmatory trial?", nine members voted for (A), seven members voted for (B) and no members voted for (C). The FDA is not required to follow the recommendations of its Advisory Committees but will take them into consideration in deciding what regulatory steps to take with respect to Makena. During the fourth quarter of 2019, we

reassessed the fair value of assets related to the Makena auto-injector following the Advisory Committee meeting and recorded significant impairment charges, as discussed in Note I, *"Goodwill and Intangible Assets, Net"* to the consolidated financial statements included in this annual report on Form 10-K.

This complex and unique situation has no clear precedent and it is therefore difficult to predict outcomes or timing of any FDA actions with respect to Makena. We remain committed to working collaboratively with the FDA to seek a path forward to ensure eligible pregnant women continue to have access to Makena and the currently approved generics that rely on Makena as the innovator drug.

AMAG-423

In September 2018, we acquired the global rights to AMAG-423 for the treatment of preeclampsia and eclampsia in antepartum and postpartum women pursuant to an option agreement entered into in July 2015 (the "Velo Agreement") with Velo Bio, LLC, a privately-held life sciences company ("Velo"). AMAG-423 is an antibody fragment currently in development for the treatment of severe preeclampsia in pregnant women and has been granted both orphan drug and Fast Track designations by the FDA. AMAG-423 is intended to bind to endogenous digitalis-like factors ("EDLFs") and remove them from the circulation. EDLFs appear to be elevated in preeclampsia and may play an important role in the pathogenesis of preeclampsia though their inhibitory actions on Na+/K+-ATPase (the sodium pump). By decreasing circulating EDLFs, AMAG-423 is believed to improve vascular endothelial function and lead to better post-delivery outcomes in affected mothers and their babies.

We are currently conducting a multi-center, randomized, double-blind, placebo-controlled, parallel-group Phase 2b/3a study in which we expect to enroll approximately 200 antepartum women with severe preeclampsia between 23 weeks and 0 days and 31 weeks and six days gestation. The study is enrolling at sites both within the U.S. and outside of the U.S. Participants in the study receive either AMAG-423 or placebo intravenously four times a day over a maximum of four days. The study's primary endpoint is to demonstrate a reduction in the percentage of babies who develop severe intraventricular hemorrhage (bleeding in the brain), necrotizing enterocolitis (severe inflammation of the infant bowels) or death by 36 weeks corrected gestational age between the AMAG-423 and placebo arms. Secondary endpoints include the change from baseline in maternal creatinine clearance, maternal incidence of pulmonary edema during treatment and the period of time between treatment and delivery. In addition to these endpoints, information on both maternal as well as neonatal outcomes and complications related to preeclampsia and/or prematurity will be collected and analyzed. Severe preeclampsia presents challenges to enrollment as it is an extremely complex and dynamic condition; oftentimes, the patient needs be scheduled for immediate delivery. While we continue to work to obtain the necessary country approvals, opening new sites as well as implementing and optimizing strategies to enhance enrollment, the serious nature of the condition under study and the characteristics of the patient population make it difficult for us to predict the timing of enrollment completion.

Ciraparantag

In January 2019, we acquired ciraparantag with our acquisition of Perosphere Pharmaceuticals Inc. ("Perosphere"), a privately-held biopharmaceutical company pursuant to an Agreement and Plan of Merger (the "Perosphere Agreement"). Ciraparantag is a small molecule anticoagulant reversal agent in development as a single dose solution that is delivered intravenously to reverse the effects of certain novel oral anticoagulants ("NOACs") (Xarelto®(rivaroxaban), Eliquis®(apixaban), and Savaysa®(edoxaban)) as well as Lovenox® (enoxaparin sodium injection), a low molecular weight heparin ("LMWH") when reversal of the anticoagulant effect of these products is needed for emergency surgery, urgent procedures or due to life-threatening or uncontrolled bleeding. Ciraparantag has been granted Fast Track designation by the FDA.

Ciraparantag has been evaluated in more than 250 healthy volunteers across seven clinical trials. A first in human Phase 1 study evaluated the safety, tolerability, pharmacokinetic, and pharmacodynamic effects of ciraparantag alone and following a single dose of Savaysa®, and another Phase 1 study evaluated the overall metabolism of the drug. Two Phase 2a studies evaluated the safety, tolerability, pharmacokinetic, and pharmacodynamic effects related to the reversal of unfractionated heparin and Lovenox® and three Phase 2b randomized, single-blind, placebo-controlled dose-ranging studies evaluated the reversal of Savaysa®, Eliquis®, and Xarelto® to assess the safety and efficacy of ciraparantag, each of which included 12 subjects dosed with ciraparantag. In these Phase 2b clinical trials, ciraparantag or placebo was administered to healthy volunteers in a blinded fashion after achieving steady blood concentrations of the respective anticoagulant. Pharmacodynamic assessments of whole blood clotting time ("WBCT"), an important laboratory measure of clotting capacity, were sampled frequently for the first hour post study drug dose, and then periodically thereafter out to 24 hours post administration of study drug. Key endpoints in the Phase 2 trials included mean change from baseline in WBCT and the proportion of subjects that returned to within 10% of their baseline WBCT. Subjects in these studies experienced a rapid and statistically significant ($p<0.001$) reduction in WBCT compared to placebo as early as 15 minutes after the administration of ciraparantag in each of

the four studies and the effect was sustained for 24 hours. Moreover, in both the Eliquis® and Xarelto® studies, 100% of subjects in the highest dose cohorts (180 mg of ciraparantag) were responders, as defined by a return to within 10% of baseline WBCT within 30 minutes and sustained for at least six hours. Ciraparantag has been well tolerated in clinical trials, with the most common related adverse events to date being mild sensations of coolness, warmth or tingling, skin flushing, and alterations in taste. There have been no drug-related serious adverse events to date.

We are planning to conduct a clinical study in healthy volunteers to confirm the proposed dose of ciraparantag to be used in the Phase 3 program, after reaching peak steady state blood concentrations of certain NOAC drugs. This proposed study will utilize an automated coagulometer developed by Perosphere Technologies, Inc. ("Perosphere Technologies"), an independent company, to measure WBCT. An investigational device exemption, which Perosphere Technologies will submit once the design of the healthy volunteer study is finalized, is required for use of the coagulometer in clinical studies. Over the past several months, Perosphere Technologies has completed additional analytic studies and we have continued to work with the FDA on the design of this next clinical study. Following the completion of this study, we plan to schedule an End of Phase 2 meeting with the FDA to discuss the design of the Phase 3 program to evaluate the safety and efficacy of ciraparantag in the target patient population. We currently expect enrollment in the healthy volunteer study to be completed by the end of 2020, assuming our proposed protocol is acceptable to the FDA and that additional dose exploration is not needed.

In December 2019, we entered into a termination and settlement agreement with Daiichi Sankyo, Inc. to terminate a clinical trial collaboration agreement we acquired in connection with the Perosphere transaction. Under the terms of the settlement agreement, we received $10.0 million in December 2019 as a termination payment from Daiichi Sankyo, Inc. In 2019, we also recognized $6.4 million of deferred revenue that we acquired from Perosphere related to the original agreement.

Products to be Divested

In January 2020, following a review of our product portfolio and strategy, we announced that we would be pursuing options to divest Intrarosa and Vyleesi from our product portfolio.

Intrarosa

In February 2017, we entered into a license agreement (the "Endoceutics License Agreement") with Endoceutics, Inc. ("Endoceutics") pursuant to which Endoceutics granted us the U.S. rights to Intrarosa, an FDA-approved product for the treatment of moderate to severe dyspareunia (pain during sexual intercourse), a symptom of vulvar and vaginal atrophy ("VVA"), due to menopause. Intrarosa was approved by the FDA in November 2016 and was launched commercially in July 2017. Intrarosa is the only FDA-approved vaginal non-estrogen treatment indicated for the treatment of moderate to severe dyspareunia, a symptom of VVA, due to menopause. Intrarosa contains prasterone, a synthetic form of dehydroepiandrosterone, which is an inactive endogenous (i.e. occurring in the body) sex steroid. The mechanism of action of Intrarosa is not fully established. Intrarosa is contraindicated in women with undiagnosed abnormal genital bleeding and its label contains a precaution that it has not been studied in women with a history of breast cancer.

Vyleesi

We acquired the exclusive rights to commercialize Vyleesi in certain territories in January 2017 pursuant to a license agreement (the "Palatin License Agreement") entered into with Palatin Technologies, Inc. ("Palatin"). On June 21, 2019, the FDA approved Vyleesi for the treatment of acquired, generalized HSDD in premenopausal women, and Vyleesi became commercially available in the U.S. in September 2019 through specialty pharmacies. Based on the June 2019 approval, we made a $60.0 million milestone payment to Palatin in July 2019, which we recorded as an intangible asset.

Vyleesi, a melanocortin receptor agonist, is an "as needed" therapy used in anticipation of sexual activity and self-administered by premenopausal women with HSDD in the thigh or abdomen via a single-use subcutaneous auto-injector. The most common adverse events are nausea, flushing, injection site reactions, headache and vomiting. Vyleesi is contraindicated in women with uncontrolled hypertension or known cardiovascular disease. In addition, the Vyleesi label includes precautions that it may cause (i) small, transient increases in blood pressure with a corresponding decrease in heart rate; (ii) focal hyperpigmentation (darkening of the skin on certain parts of the body), including the face, gums (gingiva) and breasts; and (iii) nausea.

Critical Accounting Policies

Our management's discussion and analysis of our financial condition and results of operations is based on our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the U.S. ("GAAP"). The preparation of these financial statements requires management to make certain estimates and assumptions that affect the reported amount of assets, liabilities, revenues and expenses, and the related disclosure of contingent liabilities. Actual results could differ materially from those estimates. Management employs the following critical accounting policies affecting our most significant estimates and assumptions: revenue recognition and related sales allowances and accruals; valuation of marketable securities; valuation of inventory; business combinations and asset acquisitions, including acquisition-related contingent consideration; goodwill; intangible assets; equity-based compensation; and income taxes.

Revenue Recognition

Product revenues

On January 1, 2018, we adopted Accounting Standards Codification ("ASC") Topic 606, *Revenue from Contracts with Customers* ("ASC 606"), by applying the modified retrospective transition method to all contracts that were not completed as of January 1, 2018. Results for reporting periods beginning after January 1, 2018 are presented under ASC 606, while prior period amounts are not adjusted and continue to be reported under the accounting standards in effect for prior periods. There was no impact to our product revenue as a result of adoption.

Under ASC 606, we recognize revenue when our customer obtains control of promised goods or services in an amount that reflects the consideration which we expect to receive in exchange for those goods or services. To determine revenue recognition for arrangements that we determine are within the scope of ASC 606, we perform the following five steps:

a. Identify the contract(s) with a customer;
b. Identify the performance obligations in the contract;
c. Determine the transaction price;
d. Allocate the transaction price to the performance obligations in the contract; and
e. Recognize revenue when (or as) the performance obligations are satisfied.

We only apply the five step model to contracts when it is probable that we will collect the consideration we are entitled to in exchange for the goods or services we transfer to the customer. At contract inception, if the contract is determined to be within the scope of ASC 606, we assess the goods or services promised within each contract, determine those that are performance obligations, and assess whether each promised good or service is distinct. We then recognize as revenue the amount of the transaction price that is allocated to the respective performance obligation when (or as) the performance obligation is satisfied.

Our major sources of revenue during the reporting periods were product revenues from Makena, Feraheme and Intrarosa. The adoption of ASC 606 in 2018 did not have an impact on the pattern or timing of recognition of our product revenue, as the majority of our product revenue continues to be recognized when the customer takes control of our product.

We receive payments from customers based upon contractual billing schedules; accounts receivable are recorded when the right to consideration becomes unconditional.

Performance Obligations

At contract inception, we assess the goods promised in our contracts with customers and identify a performance obligation for each promise to transfer to the customer a good (or bundle of goods) that is distinct. To identify the performance obligations, we consider all of the goods promised in the contract regardless of whether they are explicitly stated or are implied by customary business practices. We determined that the following distinct goods represent separate performance obligations:

- Supply of Makena product
- Supply of Feraheme product
- Supply of Intrarosa product
- Supply of Vyleesi product

We principally sell our products to wholesalers, specialty distributors, specialty pharmacies and other customers (collectively, "Customers"), who purchase products directly from us. Our Customers subsequently resell the products to healthcare providers and patients. In addition to distribution agreements with Customers, we enter into arrangements with healthcare providers and payers that provide for government-mandated and/or privately-negotiated rebates, chargebacks and discounts with respect to the purchase of our products.

For the majority of our Customers, we transfer control at the point in time when the goods are delivered. In instances when we perform shipping and handling activities, these are considered fulfillment activities, and accordingly, the costs are accrued when the related revenue is recognized. Taxes collected from Customers and remitted to governmental authorities are excluded from revenues.

Variable Consideration

Under ASC 606, we are required to make estimates of the net sales price, including estimates of variable consideration (such as rebates, chargebacks, discounts, copay assistance and other deductions), and recognize the estimated amount as revenue, when we transfer control of the product to our customers. Variable consideration must be determined using either an "expected value" or a "most likely amount" method.

We record product revenues net of certain allowances and accruals in our consolidated statements of operations. Product sales allowances and accruals are primarily comprised of both direct and indirect fees, discounts and rebates and provisions for estimated product returns. Direct fees, discounts and rebates are contractual fees and price adjustments payable to Customers that purchase products directly from us. Indirect fees, discounts and rebates are contractual price adjustments payable to healthcare providers and organizations, such as certain physicians, clinics, hospitals, group purchasing organizations ("GPOs"), and dialysis organizations that typically do not purchase products directly from us but rather from wholesalers and specialty distributors. Consideration payable to a Customer, or other parties that purchase goods from a Customer, are considered to be a reduction of the transaction price, and therefore, of revenue.

Product sales allowances and accruals are based on definitive contractual agreements or legal requirements (such as laws and regulations to provide mandatory discounts for sales to government entities) related to the purchase and/or utilization of the product by these entities and are recorded in the same period that the related revenue is recognized. We use the expected value method for estimating variable consideration. We estimate product sales allowances and accruals using either historical, actual and/or other data, including estimated patient usage, applicable contractual rebate rates, contract performance by the benefit providers, other current contractual and statutory requirements, historical market data based upon experience of our products and other products similar to them, specific known market events and trends such as competitive pricing and new product introductions, current and forecasted Customer buying patterns and inventory levels, and the shelf life of our products. As part of this evaluation, we also review changes to federal and other legislation, changes to rebate contracts, changes in the level of discounts, and changes in product sales trends. Although allowances and accruals are recorded at the time of product sale, rebates are typically paid out in arrears, one to three months after the sale.

The estimate of variable consideration, which is included in the transaction price, may be constrained and is included in the net sales price only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved in a future period. Estimating variable consideration and the related constraint requires the use of significant management judgment and actual amounts of consideration ultimately received may differ from our estimates. If actual results in the future vary from our estimates, we will adjust these estimates, which would affect net product revenue and earnings in the period such variances become known.

Discounts

We typically offer a 2% prompt payment discount to certain customers as an incentive to remit payment in accordance with the stated terms of the invoice, generally between 30 to 60 days. Because we anticipate that those customers who are offered this discount will take advantage of the discount, 100% of the prompt payment discount at the time of sale is accrued for eligible customers, based on the gross amount of each invoice. We adjust the accrual quarterly to reflect actual experience.

Chargebacks

Chargeback reserves represent the estimated obligations resulting from the difference between the prices at which we sell our products to wholesalers and the sales price ultimately paid to wholesalers under fixed price contracts by third-party payers, including governmental agencies. The chargeback estimates are determined based on actual product sales data and forecasted customer buying patterns. Actual chargeback amounts are determined at the time of resale to the qualified healthcare provider, and we generally issue credits for such amounts within several weeks of receiving notification from the wholesaler. Estimated chargeback amounts are recorded at the time of sale and adjusted quarterly to reflect actual experience.

Distributor/Wholesaler and Group Purchasing Organization Fees

Fees under arrangements with distributors and wholesalers are usually based upon units of product purchased during the prior month or quarter and are usually paid by us within several weeks of the receipt of an invoice from the wholesaler or distributor. Fees under arrangements with GPOs are usually based upon member purchases during the prior quarter and are generally billed by the GPO within 30 days after period end. In accordance with ASC 606, since the consideration given to the Customer is not for a distinct good or service, the consideration is a reduction of the transaction price of the vendor's products

or services. We have included these fees in contractual adjustments in the table above. We generally pay such amounts within several weeks of the receipt of an invoice from the distributor, wholesaler or GPO. Accordingly, we accrue the estimated fee due at the time of sale, based on the contracted price invoiced to the Customer. We adjust the accrual quarterly to reflect actual experience.

Product Returns

Consistent with industry practice, we generally offer wholesalers, specialty distributors and other customers a limited right to return our products based on the product's expiration date. The current shelf-lives or time between manufacture and expiration for products in our portfolio range from three to five years. Product returns are estimated based on the historical return patterns and known or expected changes in the marketplace. We track actual returns by individual production lots. Returns on lots eligible for credits under our returned goods policy are monitored and compared with historical return trends and rates. We expect that wholesalers and healthcare providers will not stock significant inventory due to the cost of the product, the expense to store our products, and/or that our products are readily available for distribution. We record an estimate of returns at the time of sale. If necessary, our estimated rate of returns may be adjusted for actual return experience as it becomes available and for known or expected changes in the marketplace. There were no material adjustments to our reserve for product returns during the years ended December 31, 2019, 2018 or 2017. To date, our product returns have been relatively limited; however, returns experience may change over time. We may be required to make future adjustments to our product returns estimate, which would result in a corresponding change to our net product sales in the period of adjustment and could be significant.

Sales Rebates

We contract with various private payer organizations, primarily pharmacy benefit managers, for the payment of rebates with respect to utilization of our products. We determine our estimates for rebates, if applicable, based on actual product sales data and our historical product claims experience. Rebate amounts generally are invoiced quarterly and are paid in arrears, and we expect to pay such amounts within several weeks of notification by the provider. We regularly assess our reserve balance and the rate at which we accrue for claims against product sales. If we determine in future periods that our actual rebate experience is not indicative of expected claims, if actual claims experience changes, or if other factors affect estimated claims rates, we may be required to adjust our current accumulated reserve estimate, which would affect net product sales in the period of the adjustment and could be significant.

Governmental Rebates

Governmental rebates relate to our reimbursement arrangements with state Medicaid programs. We determine our estimates for Medicaid rebates, if applicable, based on actual product sales data and our historical product claims experience. In estimating these reserves, we provide for a Medicaid rebate associated with both those expected instances where Medicaid will act as the primary insurer as well as in those instances where we expect Medicaid will act as the secondary insurer. Rebate amounts generally are invoiced quarterly and are paid in arrears, and we expect to pay such amounts within several weeks of notification by the Medicaid or provider entity. We regularly assess our Medicaid reserve balance and the rate at which we accrue for claims against product sales. If we determine in future periods that our actual rebate experience is not indicative of expected claims, if actual claims experience changes, or if other factors affect estimated claims rates, we may be required to adjust our current Medicaid accumulated reserve estimate, which would affect net product sales in the period of the adjustment and could be significant.

Other Discounts

Other discounts which we offer include voluntary patient assistance programs, such as copay assistance programs, which are intended to provide financial assistance to qualified commercially insured patients with prescription drug copayments required by payers. The calculation of the accrual for copay assistance is based on an estimate of claims and the cost per claim that we expect to receive associated with product that has been recognized as revenue.

Collaboration Revenues

When we enter into collaboration agreements, we assess whether the agreements fall within the scope of ASC Topic 808, *Collaborative Arrangements* ("ASC 808") based on whether the arrangements involve joint operating activities and whether both parties have active participation in the arrangement and are exposed to significant risks and rewards. To the extent that the arrangement falls within the scope of ASC 808, we assess whether the payments between us and our collaboration partner fall within the scope of other accounting literature. If we conclude that payments from the collaboration partner to us represent

consideration from a customer, such as license fees and contract research and development activities, we account for those payments within the scope of ASC 606. However, if we conclude that our collaboration partner is not a customer for certain activities and associated payments, such as for certain collaborative research, development, manufacturing and commercial activities, we present such payments as a reduction of research and development expense or general and administrative expense, based on where we present the related underlying expense.

Marketable Securities

We account for and classify our marketable securities as either "available-for-sale," "held-to-maturity," or "trading debt securities," in accordance with the accounting guidance related to the accounting and classification of certain investments in marketable securities. The determination of the appropriate classification by us is based primarily on management's ability and intent to sell the debt security at the time of purchase. As of December 31, 2019 and 2018, all of our marketable securities were classified as available-for-sale.

Available-for-sale securities are those securities which we view as available for use in current operations, if needed. We generally classify our available-for-sale securities as short-term investments, even though the stated maturity date may be one year or more beyond the current balance sheet date. Available-for-sale marketable securities are stated at fair value with their unrealized gains and losses included in accumulated other comprehensive income (loss) within the consolidated statements of stockholders' equity, until such gains and losses are realized in other income (expense) within the consolidated statements of operations or until an unrealized loss is considered other-than-temporary.

We recognize other-than-temporary impairments of our marketable securities when there is a decline in fair value below the amortized cost basis and if (a) we have the intent to sell the security or (b) it is more likely than not that we will be required to sell the security prior to recovery of its amortized cost basis. If either of these conditions is met, we recognize the difference between the amortized cost basis of the security and its fair value at the impairment measurement date in our consolidated statements of operations. If neither of these conditions is met, we must perform additional analysis to evaluate whether the unrealized loss is associated with the creditworthiness of the issuer of the security rather than other factors, such as interest rates or market factors. If we determine from this analysis that we do not expect to receive cash flows sufficient to recover the entire amortized cost of the security, a credit loss exists, the impairment is considered other-than-temporary and is recognized in our consolidated statements of operations.

Inventory

Inventory is stated at the lower of cost or net realizable value, with approximate cost being determined on a first-in, first-out basis. Prior to initial approval from the FDA or other regulatory agencies, we expense costs relating to the production of inventory in the period incurred, unless we believe regulatory approval and subsequent commercialization of the product candidate is probable and we expect the future economic benefit from sales of the product to be realized, at which point we capitalize the costs as inventory. We assess any costs capitalized prior to regulatory approval each quarter for indicators of impairment, such as a reduced likelihood of approval. We expense costs associated with clinical trial material as research and development expense.

On a quarterly basis, we analyze our inventory levels to determine whether we have any obsolete, expired, or excess inventory. If any inventory is expected to expire prior to being sold, has a cost basis in excess of its net realizable value, is in excess of expected sales requirements as determined by internal sales forecasts, or fails to meet commercial sale specifications, the inventory is written-down through a charge to cost of product sales. The determination of whether inventory costs will be realizable requires estimates by management of future expected inventory requirements, based on sales forecasts. Once packaged, our products have a shelf-life ranging from three to five years. As a result of comparison to internal sales forecasts, we expect to fully realize the carrying value of our finished goods inventory. If actual market conditions are less favorable than those projected by management or in the event of an adverse FDA action, inventory write-downs may be required. Charges for inventory write-downs are not reversed if it is later determined that the product is saleable.

Business Combinations and Asset Acquisitions

The purchase price allocation for business combinations requires extensive use of accounting estimates and judgments to allocate the purchase price to the identifiable tangible and intangible assets acquired and liabilities assumed based on their respective fair values. Under Accounting Standards Update ("ASU") No. 2017-01, "*Business Combinations (Topic 805): Clarifying the Definition of a Business* ("2017-01"), we first determine whether substantially all of the fair value of the gross assets acquired is concentrated in a single identifiable asset or a group of similar identifiable assets. If this threshold is met, the single asset or group of assets, as applicable, is not a business.

We account for business combinations using the acquisition method of accounting, under which the total purchase price of an acquisition is allocated to the net tangible and identifiable intangible assets acquired and liabilities assumed based on their estimated fair values as of the acquisition date. Acquisition-related costs are expensed as incurred. Any excess of the consideration transferred over the estimated fair values of the identifiable net assets acquired is recorded as goodwill.

The purchase price allocations for business combinations are initially prepared on a preliminary basis and are subject to change as additional information becomes available concerning the fair value and tax basis of the assets acquired and liabilities assumed. Any adjustments to the purchase price allocations are made as soon as practicable but no later than one year from the acquisition date.

Acquired inventory is recorded at its fair value, which may require a step-up adjustment to recognize the inventory at its expected net realizable value. The inventory step-up is recorded to cost of product sales in our consolidated statements of operations when related inventory is sold, and we record step-up costs associated with clinical trial material as research and development expense.

Acquisition-Related Contingent Consideration

Contingent consideration arising from a business combination is included as part of the purchase price and is recognized at its estimated fair value as of the acquisition date. Subsequent to the acquisition date, we measure contingent consideration arrangements at fair value for each period until the contingency is resolved. These changes in fair value are recognized in selling, general and administrative expenses in our consolidated statements of operations. Changes in fair values reflect new information about the likelihood of the payment of the contingent consideration and the passage of time. For asset acquisitions, we record contingent consideration for obligations we consider to be probable and estimable and these liabilities are not adjusted to fair value.

Goodwill

We test goodwill at the reporting unit level for impairment on an annual basis and between annual tests if events and circumstances indicate it is more likely than not that the fair value of a reporting unit is less than its carrying value. Events that could indicate impairment and trigger an interim impairment assessment include, but are not limited to, an adverse change in current economic and market conditions, including a significant prolonged decline in market capitalization, a significant adverse change in legal factors, unexpected adverse business conditions, and an adverse action or assessment by a regulator. Our annual impairment test date is October 31. We have determined that we operate in a single operating segment and have a single reporting unit.

In performing our goodwill impairment tests, we utilize the approach prescribed under ASC 350, as amended by ASU 2017-04, *Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment* ("ASU 2017-04"), which requires that an entity perform its annual, or interim, goodwill impairment test by comparing the fair value of a reporting unit with its carrying amount. An entity should recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value.

When we perform any goodwill impairment test, the estimated fair value of our reporting unit is determined using either an income approach (utilizing a discounted cash flow ("DCF") model) or a market approach, when appropriate, which assesses our market capitalization as adjusted for a control premium, or a combination thereof. Under the market approach, when our carrying value exceeds our market capitalization, we consider a control premium for purposes of estimating the fair value of our reporting unit, as we believe that a market participant buyer would be required to pay a control premium for our business. As described in the accounting guidance for evaluating long-lived assets for impairment, an entity's fair value may include a control premium in addition to the quoted market price to determine the fair value of a single reporting unit entity, as an acquiring entity is often willing to pay more for equity securities that give it a controlling interest than an investor would pay for a number of equity securities representing less than a controlling interest. This accounting guidance also indicates that the quoted market price of an individual security need not be the sole measurement basis of the fair value of a single reporting unit. When our market capitalization exceeds our carrying value, we utilize our market capitalization as the indicator of fair value in our impairment test.

When utilizing an income approach, the DCF model is based upon expected future after-tax operating cash flows of the reporting unit discounted to a present value using a risk-adjusted discount rate. Estimates of future cash flows require management to make significant assumptions concerning (i) future operating performance, including future sales, long-term growth rates, operating margins, variations in the amount and timing of cash flows and the probability of achieving the

estimated cash flows (ii) the probability of regulatory approvals, and (iii) future economic conditions, all of which may differ from actual future cash flows. These assumptions are based on significant inputs not observable in the market and thus represent Level 3 measurements within the fair value hierarchy. The discount rate, which is intended to reflect the risks inherent in future cash flow projections, used in the DCF model, is based on estimates of the weighted average cost of capital ("WACC") of market participants relative to our reporting unit. Financial and credit market volatility can directly impact certain inputs and assumptions used to develop the WACC. Any changes in these assumptions may affect our fair value estimate and the result of an impairment test. The discount rates and other inputs and assumptions are consistent with those that a market participant would use. In addition, in order to assess the reasonableness of the fair value of our reporting unit as calculated under the DCF model, we also compare the reporting unit's fair value to our market capitalization and calculate an implied control premium. We evaluate the implied control premium by comparing it to control premiums of recent comparable market transactions, as applicable. For additional information, see Note I, "*Goodwill and Intangible Assets, Net*" to our consolidated financial statements included in this Annual Report on Form 10-K.

Intangible Assets

We amortize our intangible assets that have finite lives based on either the straight-line method, or if reliably determinable, based on the pattern in which the economic benefit of the asset is expected to be utilized.

If we acquire an asset or a group of assets that do not meet the definition of a business, the acquired IPR&D is expensed on its acquisition date. Future costs to develop these assets are recorded to research and development expense as they are incurred.

Impairment of Long-Lived Assets

We review our long-lived assets, which includes property and equipment and identifiable intangible assets for impairment whenever events or changes in circumstances indicate that the carrying value of an asset or asset group may not be recoverable. To evaluate recoverability, management compares the projected undiscounted future cash flows associated with the asset or asset group, including proceeds from its eventual disposition over its estimated useful life against its carrying amount. If the undiscounted cash flows are not sufficient to recover the carrying value of the asset or asset group, the asset or asset group is considered impaired. The impairment loss, if any, is measured as the excess of the carrying amount of the asset or asset group over its estimated fair value, which is typically calculated utilizing a DCF model following the same methodology as described in the preceding section.

Equity-Based Compensation

Equity-based compensation cost is generally measured at the estimated grant date fair value and recorded to expense over the requisite service period, which is generally the vesting period. Because equity-based compensation expense is based on awards ultimately expected to vest, we must make certain judgments about whether employees, officers, directors, consultants and advisers will complete the requisite service period, and reduce the compensation expense being recognized for estimated forfeitures. Forfeitures are estimated at the time of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates. Forfeitures are estimated based upon historical experience and adjusted for unusual events such as corporate restructurings, which can result in higher than expected turnover and forfeitures. If factors change and we employ different assumptions in future periods, the compensation expense that we record in the future may differ significantly from what we have recorded in the current period.

We estimate the fair value of equity-based compensation involving stock options based on the Black-Scholes option pricing model. This model requires the input of several factors such as the expected option term, the expected risk-free interest rate over the expected option term, the expected volatility of our stock price over the expected option term and the expected dividend yield over the expected option term and are subject to various assumptions. The fair value of awards calculated using the Black-Scholes option pricing model is generally amortized on a straight-line basis over the requisite service period, and is recognized based on the proportionate amount of the requisite service period that has been rendered during each reporting period.

We estimate the fair value of our restricted stock units ("RSUs") whose vesting is contingent upon market conditions, such as total shareholder return, using the Monte-Carlo simulation model. The fair value of RSUs where vesting is contingent upon market conditions is amortized based upon the estimated derived service period. The fair value of RSUs granted to our employees and directors whose vesting is dependent on future service is determined based upon the quoted closing market price per share on the date of grant, adjusted for estimated forfeitures.

We believe our valuation methodologies are appropriate for estimating the fair value of the equity awards we grant to our employees and directors. Our equity award valuations are estimates and may not be reflective of actual future results or amounts ultimately realized by recipients of these grants. These amounts are subject to future quarterly adjustments based upon a variety of factors, which include, but are not limited to, changes in estimated forfeiture rates and the issuance of new equity-based awards.

Income Taxes

We use the asset and liability method of accounting for deferred income taxes. Under this method, deferred tax assets and liabilities are recognized for the estimated future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. A deferred tax asset is established for the expected future benefit of net operating loss ("NOL") and credit carryforwards. Deferred tax assets and liabilities are measured using enacted rates in effect for the year in which those temporary differences are expected to be recovered or settled. A valuation allowance against net deferred tax assets is required if, based on available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized. Significant judgments, estimates and assumptions regarding future events, such as the amount, timing and character of income, deductions and tax credits, are required in the determination of our provision for income taxes and whether valuation allowances are required against deferred tax assets. In evaluating our ability to recover our deferred tax assets, we consider all available evidence, both positive and negative, including the existence of taxable temporary differences, our past operating results, the existence of cumulative income in the most recent fiscal years, changes in the business in which we operate and our forecast of future taxable income. In determining future taxable income, we are responsible for assumptions utilized including the amount of state and federal operating income, the reversal of temporary differences and the implementation of feasible and prudent tax planning strategies. These assumptions require significant judgment about the forecasts of future taxable income. As of December 31, 2019, we have established a valuation allowance on our net deferred tax assets other than refundable alternative minimum tax ("AMT") credits to the extent that our existing taxable temporary differences would not be available as a source of income to realize the benefits of those deferred tax assets.

We account for uncertain tax positions using a "more-likely-than-not" threshold for recognizing and resolving uncertain tax positions. The evaluation of uncertain tax positions is based on factors that include, but are not limited to, changes in tax law, the measurement of tax positions taken or expected to be taken in tax returns, the effective settlement of matters subject to audit, new audit activity, and changes in facts or circumstances related to a tax position. We evaluate uncertain tax positions on a quarterly basis and adjust the level of the liability to reflect any subsequent changes in the relevant facts surrounding the uncertain positions. Any changes to these estimates, based on the actual results obtained and/or a change in assumptions, could impact our income tax provision in future periods. Interest and penalty charges, if any, related to unrecognized tax benefits would be classified as a provision for income tax in our consolidated statement of operations.

Impact of Recently Issued and Proposed Accounting Pronouncements

From time to time, new accounting pronouncements are issued by the Financial Accounting Standards Board or other standard setting bodies that are adopted by us as of the specified effective date. Unless otherwise discussed, we believe that the impact of recently issued standards that are not yet effective will not have a material impact on our financial position or results of operations upon adoption. For further discussion on recent accounting pronouncements, please see Note V, "*Recently Issued and Proposed Accounting Pronouncements*," to our consolidated financial statements included in this Annual Report on Form 10-K for additional information.

Results of Operations - 2019 as compared to 2018

Revenues

Total revenues for 2019 and 2018 consisted of the following (in thousands except for percentages):

	Years Ended December 31,		2019 to 2018	
	2019	2018	$ Change	% Change
Product sales, net				
Feraheme	$ 167,947	$ 135,001	$ 32,946	24 %
Makena	120,859	320,311	(199,452)	(62)%
Intrarosa	21,417	16,218	5,199	32 %
Other	(238)	368	(606)	<(100 %)
Total	309,985	471,898	(161,913)	(34)%
Other revenues	16,561	150	16,411	>100 %
Total revenues	$ 326,546	$ 472,048	$ (145,502)	(31)%

Our total revenues for 2019 decreased by $145.5 million as compared to 2018, due primarily to a $260.0 million decrease in Makena IM net sales driven by supply disruptions, generic competition, changes in estimates to prior period liabilities and our withdrawal from the IM market during 2019, partially offset by an increase in Makena auto-injector net sales. Also offsetting the decrease in Makena revenues was a $32.9 million increase in Feraheme net sales in 2019, as compared to 2018.

In addition, during the fourth quarter of 2019, we entered into a termination and settlement agreement (the "Termination Agreement") with Daiichi Sankyo, Inc. to terminate a clinical trial collaboration agreement we acquired in connection with the Perosphere transaction. Under the terms of the settlement agreement we received $10.0 million in December 2019. As more fully described in Note D "*Revenue Recognition*" to the consolidated financial statements included in this Annual Report on Form 10-K, the $10.0 million termination payment and $6.4 million of deferred revenue that we acquired from Perosphere were recognized as collaboration revenue in our consolidated statements of operations for the year ended December 31, 2019.

We expect that total net product sales for 2020 will decrease compared to 2019 due to an expected decline in Makena net product sales and our intention to divest Intrarosa and Vyleesi during the first half of 2020. We expect these declines to be partially offset by increases in Feraheme net sales.

The following table sets forth customers who represented 10% or more of our total revenues for 2019 and 2018:

	Years Ended December 31,	
	2019	2018
McKesson Corporation	36%	26%
AmerisourceBergen Drug Corporation	28%	27%
Cardinal Health	13%	< 10%

Product Sales Allowances and Accruals

Total gross product sales were offset by product sales allowances and accruals for 2019 and 2018 as follows (in thousands except for percentages):

	Years Ended December 31,				2019 to 2018	
	2019	Percent of gross product sales	2018	Percent of gross product sales	$ Change	% Change
Gross product sales	$ 955,693		$ 974,330		$ (18,637)	(2)%
Provision for product sales allowances and accruals:						
Contractual adjustments	530,645	56%	387,540	40%	143,105	37 %
Governmental rebates	115,063	12%	114,892	12%	171	1 %
Total	645,708	68%	502,432	52%	143,276	29 %
Product sales, net	$ 309,985		$ 471,898		$ (161,913)	(34)%

The increase in contractual adjustments as a percentage of gross product sales primarily related to an increase in rebates offered to commercial purchasers and payers.

We record product revenue net of certain allowances and accruals on our consolidated statements of operations. Our contractual adjustments include provisions for returns, pricing and prompt payment discounts, as well as wholesaler distribution fees, rebates to hospitals that qualify for 340B pricing, and volume-based and other commercial rebates and other discounts. Governmental rebates relate to our reimbursement arrangements with state Medicaid programs.

We may refine our estimated revenue reserves as we continue to obtain additional experience or as our customer mix changes. If we determine in future periods that our actual experience is not indicative of our expectations, if our actual experience changes, or if other factors affect our estimates, we may be required to adjust our allowances and accruals estimates, which would affect our net product sales in the period of the adjustment and could be significant.

An analysis of the amount of our product reserves for 2019 and 2018, is as follows (in thousands):

	Contractual Adjustments	Governmental Rebates	Total
Balance at January 1, 2018	$ 62,164	$ 53,742	$ 115,906
Current provisions relating to sales in current year	389,861	106,988	496,849
Adjustments relating to sales in prior years	(2,330)	7,903	5,573
Payments/returns relating to sales in current year	(333,694)	(75,920)	(409,614)
Payments/returns relating to sales in prior years	(58,802)	(58,501)	(117,303)
Balance at December 31, 2018	$ 57,199	$ 34,212	$ 91,411
Current provisions relating to sales in current year	521,916	100,926	622,842
Adjustments relating to sales in prior years	8,774	14,137	22,911
Payments/returns relating to sales in current year	(431,014)	(60,218)	(491,232)
Payments/returns relating to sales in prior years	(61,654)	(41,435)	(103,089)
Balance at December 31, 2019	$ 95,221	$ 47,622	$ 142,843

Costs and Expenses

Cost of Product Sales

Cost of product sales for 2019 and 2018 were as follows (in thousands except for percentages):

	Years Ended December 31,		2019 to 2018	
	2019	2018	$ Change	% Change
Direct cost of product sales	$ 82,393	$ 57,492	$ 24,901	43 %
Amortization of intangible assets	$ 24,800	$ 158,400	$ (133,600)	(84)%
	$ 107,193	$ 215,892	$ (108,699)	(50)%
Direct cost of product sales as a percentage of net product sales	27%	12%		

Our cost of product sales are primarily comprised of manufacturing costs, costs of managing our contract manufacturers, costs for quality assurance and quality control associated with our product sales, royalty obligations and the amortization of product-related intangible assets. Direct cost of product sales as a percentage of net product sales increased from 12% during the year ended December 31, 2018 to 27% during the year ended December 31, 2019, driven by a shift in revenue mix from products with a lower cost of product sales, such as the Makena IM product, to products with a higher cost of product sales, such as the Makena auto-injector and inventory write downs recorded in conjunction with the impairments of the Makena base technology and Makena auto-injector asset groups. We expect direct cost of product sales as a percentage of net product sales to decline in 2020 based on our expectation that a higher proportion of our revenue will be from Feraheme.

Amortization of intangible assets decreased by $133.6 million from December 31, 2018 to December 31, 2019, primarily due to a decrease in amortization of the Makena base technology intangible asset, which related to our Makena IM products and was fully impaired during the second quarter of 2019.

Research and Development Expenses

Research and development expenses include both external and internal expenses. External expenses primarily include costs of clinical trials and fees paid to contract research organizations (“CROs”), clinical supply and manufacturing expenses, regulatory filing fees, consulting and professional fees as well as other general costs related to the execution of research and development activities. Internal expenses primarily include compensation of employees engaged in research and development activities. Research and development expenses are expensed as incurred. Where possible, we track our external costs by major project. To the extent that external costs are not attributable to a specific project or activity, they are included in other external costs. Prior to the initial regulatory approval of our products or development of new manufacturing processes, costs associated with manufacturing process development and the manufacture of drug product are recorded as research and development expenses, unless we believe regulatory approval and subsequent commercialization of the product candidate is probable and we expect the future economic benefit from sales of the product to be realized, at which point we capitalize the costs as inventory.

Research and development expenses for 2019 and 2018 consisted of the following (in thousands except for percentages):

	Years Ended December 31,		2019 to 2018	
	2019	2018	$ Change	% Change
External research and development expenses	$ 41,654	27,898	13,756	49%
Internal research and development expenses	23,199	16,948	6,251	37%
Total research and development expenses	$ 64,853	$ 44,846	$ 20,007	45%

Total research and development expenses incurred in 2019 increased by $20.0 million, or 45%, as compared to 2018 primarily related to our development program for AMAG-423 and increases in internal costs related headcount to support our development programs.

We have a number of ongoing research and development programs that we are conducting independently or in collaboration with third parties. We expect our research and development expenses to remain consistent in 2020 as compared to 2019 as we continue to invest in AMAG-423 and ciraparantag. We cannot determine with certainty the duration and completion costs of our current or future clinical trials of our products or product candidates as the duration, costs and timing of clinical trials depends on a variety of factors including the uncertainties of future clinical and preclinical studies, uncertainties in clinical trial enrollment rates and significant and changing government regulation.

Acquired In-Process Research and Development

During 2019, we recorded $74.9 million for acquired in-process research and development ("IPR&D") related to the acquisition of ciraparantag from Perosphere.

During 2018, we recorded $32.5 million for acquired IPR&D related to a $20.0 million milestone obligation to Palatin associated with the FDA acceptance of the Vyleesi New Drug Application ("NDA") and $12.5 million as an upfront option exercise fee in connection with our acquisition of AMAG-423.

Selling, General and Administrative Expenses

Our selling, general and administrative expenses include costs related to our commercial personnel, including our specialty sales forces, medical education professionals, pharmacovigilance, safety monitoring and commercial support personnel, costs related to our administrative personnel, including our legal, finance, business development and executive personnel, external and facilities costs required to support the marketing and sale of our products, and other costs associated with our corporate activities.

Selling, general and administrative expenses for 2019 and 2018 consisted of the following (in thousands except for percentages):

	Years Ended December 31,		2019 to 2018	
	2019	2018	$ Change	% Change
Compensation, payroll taxes and benefits	$ 107,362	$ 126,754	$ (19,392)	(15)%
Professional, consulting and other outside services	164,690	134,049	30,641	23 %
Fair value of contingent consideration liability	(270)	(49,607)	49,337	(99)%
Equity-based compensation expense	14,818	16,614	(1,796)	(11)%
Total selling, general and administrative expenses	$ 286,600	$ 227,810	$ 58,790	26 %

Total selling, general and administrative expenses in 2018 included a $49.6 million decrease to the fair value of contingent consideration liability expense based on actual Makena net sales and our expectations for future performance. Excluding this decrease, selling, general and administrative expenses increased by $9.2 million as compared to 2018. This increase was driven primarily by higher external costs to support the September 2019 launch of Vyleesi, partially offset by a decrease in costs as a result of our February 2019 restructuring to combine our women's health and maternal health sales forces.

We expect that total selling, general and administrative expenses will decrease substantially in 2020 as compared to 2019 with the planned divestiture of Intrarosa and Vyleesi.

Impairment of Assets

As more fully described in Note I, "*Goodwill and Intangible Assets, Net*" to the consolidated financial statements included in this Annual Report on Form 10-K, we recorded $232.3 million of impairment charges during 2019 related to the asset groups containing the Makena base technology, the Makena auto-injector developed technology, the Intrarosa developed technology and Vyleesi developed technology.

There were no asset impairments during the year ended December 31, 2018.

Restructuring Expense

In February 2019, we completed a restructuring to combine our women's health and maternal health sales forces into one integrated sales team. Approximately 110 employees were displaced through this workforce reduction. We recorded a one-time restructuring charge of $7.4 million primarily related to severance and related benefits in the first quarter of 2019 and expect these charges to be substantially paid in cash by the end of the first quarter of 2020. Estimated total savings from the restructuring in 2019 were approximately $15.2 million of selling, general and administrative expense, specifically related to compensation, payroll taxes and benefits. Estimated savings were partially offset by planned increases in selling, general and administrative expenses related to professional, consulting and other outside services associated with the launch of Vyleesi and continued investment in the growth of our commercial products. For additional information on restructuring expenses, see Note S, "*Restructuring Expenses*" to our consolidated financial statements included in this Annual Report on Form 10-K.

Other Expense, Net

Other expense, net for 2019 and 2018 consisted of the following (in thousands except for percentages):

	Years Ended December 31,		2019 to 2018	
	2019	2018	$ Change	% Change
Interest expense	$ (25,709)	$ (51,971)	$ 26,262	(51)%
Loss on debt extinguishment	—	(35,922)	35,922	(100)%
Interest and dividend income	4,285	5,328	(1,043)	(20)%
Other expense	428	(74)	502	>(100 %)
Total other expense, net	$ (20,996)	$ (82,639)	$ 61,643	(75)%

Other expense, net for 2019 decreased by $61.6 million compared to 2018, primarily due to (i) a $35.9 million loss on extinguishment of debt (including a $28.1 million redemption premium), incurred during 2018 as a result of the early redemption of the 2023 Senior Notes, and (ii) a $26.3 million reduction in interest expense in 2019 as a result of this redemption and the repayment of the 2019 Convertible Notes in February 2019.

We expect our other expense, net to remain consistent in 2020 as compared to 2019.

Income Tax (Benefit) Expense

The following table summarizes our effective tax rate and income tax (benefit) expense for 2019 and 2018 (in thousands except for percentages):

	Years Ended December 31,	
	2019	2018
Effective tax rate	—%	(31)%
Income tax expense (benefit)	$ (47)	$ 40,436

For 2019, we recognized an immaterial income tax benefit, representing an effective tax rate of 0%. The difference between the expected statutory federal tax rate of 21% and the 0% effective tax rate for 2019 was primarily attributable to the valuation allowance established against our current period losses generated and the non-deductible IPR&D expense related to the Perosphere acquisition. We have established a valuation allowance on our deferred tax assets other than refundable AMT credits to the extent that our existing taxable temporary differences would not be available as a source of income to realize the benefits of those deferred tax assets. The income tax benefit for the year ended December 31, 2019 primarily related to the offset of the recognition of the income tax expense recorded in other comprehensive loss associated with the increase in the value of available-for-sale securities that we carried at fair market value during the period, partially offset by state income taxes.

For 2018, we recognized income tax expense of $40.4 million, representing an effective tax rate of (31)%. The difference between the expected statutory federal tax rate of 21% and the (31)% effective tax rate for 2018 was primarily attributable to the establishment of a valuation allowance on net deferred tax assets other than refundable AMT credits, the impact of non-deductible stock compensation and other non-deductible expenses, partially offset by a benefit from contingent consideration associated with Lumara Health, state income taxes and orphan drug tax credits. Our valuation allowance on our deferred tax assets, other than refundable AMT credits, increased during the year ended December 31, 2018 primarily because the deferred tax liabilities associated with the CBR business, which was reclassified to discontinued operations and sold during 2018, are no longer available as a source of income to realize the benefits of the net deferred tax assets.

Net Income from Discontinued Operations

Net income from discontinued operations was $103.6 million in 2018. Of the $103.6 million net income from discontinued operations, $87.1 million represented a gain on the sale of the CBR business, which closed on August 6, 2018. For additional information, see Note C, "*Discontinued Operations,*" to our consolidated financial statements included in this Annual Report on Form 10-K.

Results of Operations - 2018 as compared to 2017

Management's discussion and analysis of our results of operations for the year ended December 31, 2018 compared to the year ended December 31, 2017 may be found in the "Management's Discussion and Analysis of Financial Condition and Results of Operations - 2018 as compared to 2017 section of our Annual Report on Form 10-K for the year ended December 31, 2018, filed with the SEC on March 1, 2019 (the "2018 Annual Report"), which discussion is incorporated herein by reference. Our results of operations for the years ended December 31, 2018 and 2017 as presented in the "Management's Discussion and Analysis of Financial Condition and Results of Operations - 2018 as compared to 2017" section of our 2018 Annual Report were not revised to reflect the correction of the immaterial errors disclosed in Note X, *"Revision of Prior Period Financial Statements"*. Due to the immaterial nature of these errors, they had no impact on management's discussion contained in our 2018 Annual Report.

Liquidity and Capital Resources

General

We currently finance our operations primarily from cash generated from our operating activities, including sales of our commercialized products. Cash, cash equivalents, marketable securities and certain financial obligations as of December 31, 2019 and 2018 consisted of the following (in thousands except for percentages):

	December 31,			
	2019	2018	$ Change	% Change
Cash and cash equivalents	$ 113,009	$ 253,256	$ (140,247)	(55)%
Marketable Securities	58,742	140,915	(82,173)	(58)%
Total	$ 171,751	$ 394,171	$ (222,420)	(56)%
Outstanding principal on 2022 Convertible Notes	$ 320,000	$ 320,000	$ —	— %
Outstanding principal on 2019 Convertible Notes	—	21,417	(21,417)	(100)%
Total	$ 320,000	$ 341,417	$ (21,417)	(6)%

Cash Flows

The following table presents a summary of the primary sources and uses of cash for the years ended December 31, 2019, 2018 and 2017 (in thousands):

	For the Years Ended December 31			2019 compared to 2018	2018 compared to 2017
(In thousands, except percentages)	2019	2018	2017		
Net cash (used in) provided by operating activities	$ (125,696)	$ 60,800	$ 106,596	$ (186,496)	$ (45,796)
Net cash provided by investing activities	20,962	502,155	102,920	(481,193)	399,235
Net cash used in financing activities	(35,513)	(501,974)	(293,644)	466,461	(208,330)
Net (decrease) increase in cash, cash equivalents and restricted cash	$ (140,247)	$ 60,981	$ (84,128)	$ (201,228)	$ 145,109

Operating Activities

Cash flows from operating activities represent the cash receipts and disbursements related to all of our activities other than investing and financing activities. We have historically financed our operating and capital expenditures primarily through cash flows earned through our operations. We expect cash provided by operating activities in addition to our cash, cash equivalents and marketable securities will continue to be a primary source of funds to finance operating needs and capital expenditures.

Operating cash flow is derived by adjusting our net income (loss) for:

- Non-cash operating items, such as depreciation and amortization, impairment of long-lived assets and equity-based compensation; and
- Changes in operating assets and liabilities, which reflect timing differences between the receipt and payment of cash associated with transactions and when they are recognized in results of operations.

For 2019 compared to 2018, net cash flows provided by operating activities decreased by $186.5 million, driven primarily by a decrease in net income as adjusted for non-cash charges of $205.5 million and a $19.0 million increase due to changes in operating assets and liabilities. Included within net loss for 2019 was $74.9 million of acquired IPR&D expense related to the Perosphere asset acquisition, of which $60.8 million was paid in cash during the first quarter of 2019. The cash flows from

operating activities for 2018 include cash flows from the operating activities of the CBR business, which are included in discontinued operations. Subsequent to the closing of the CBR transaction on August 6, 2018, we no longer generated cash flows from that business. See Note C, "*Discontinued Operations*," to our consolidated financial statements included in this Annual Report on Form 10-K for further detail regarding our discontinued operations.

For 2018 compared to 2017, net cash flows provided by operations decreased by $45.8 million, driven primarily by a decrease in net income as adjusted for non-cash charges of $29.8 million and a $15.9 million decrease due to changes in operating assets and liabilities.

Investing Activities

Cash flows provided by investing activities was $21.0 million in 2019 due primarily to net proceeds from the sale of marketable securities of $83.5 million, partially offset by a $60.0 million milestone payment triggered by the FDA approval of Vyleesi and capital expenditures of $2.5 million.

Cash flows provided by investing activities in 2018 was $502.2 million due to $519.3 million in proceeds from the sale of CBR, partially offset by net purchases of marketable securities of $4.6 million and capital expenditures of $2.5 million.

Cash flows provided by investing activities in 2017 was $102.9 million due to net proceeds from the sale of marketable securities of $167.7 million, partially offset by $55.8 million of cash used to purchase the Intrarosa asset and capital expenditures of $9.0 million.

Financing Activities

Cash used in financing activities was $35.5 million in 2019 due to the $21.4 million repayment of our 2019 Convertible Notes, $13.7 million for the repurchase of common stock and $1.8 million for payments of employee tax withholdings related to equity-based compensation offset by $1.5 million of proceeds from the issuance of common stock under the Employee Stock Purchase Plan.

Cash used in financing activities was $502.0 million in 2018 due to the repayment of the $475.0 million balance of our 2023 Senior Notes and a related redemption premium of $28.1 million.

Cash used in financing activities in 2017 was $293.6 million driven by $353.1 million of principal payments made during 2017, including the full repayment of the remaining balance of a 2015 term loan facility, $191.7 million used for the repurchase of a portion of our 2019 Convertible Notes, $39.8 million of contingent consideration payments and the repurchase of common stock of $19.5 million, partially offset by $320.0 million net proceeds related to the issuance of our 2022 Convertible Notes.

Future Liquidity Considerations

We believe that our cash, cash equivalents and marketable securities as of December 31, 2019, and the cash we expect to receive from sales of our products, will be sufficient to fund our current operating plans and capital expenditure requirements for at least twelve months from the date of issuance of these financial statements.

We generated negative cash flows from operations during the year ended December 31, 2019 and while we expect to generate positive cash flows from continuing operations during 2020, these cash flows and our cash on hand as of December 31, 2019 in the aggregate will be insufficient to settle our 2022 Convertible Notes. We therefore expect that we will need to issue new securities, in the form of debt, equity or equity-linked, or some combination thereof. We may also utilize proceeds from a potential strategic collaboration or other transaction to manage our existing obligations.

For a detailed discussion regarding the risks and uncertainties related to our liquidity and capital resources, please refer to our Risk Factors in Part I, Item 1A of this Annual Report on Form 10-K.

Borrowings and Other Liabilities

In the second quarter of 2017, we issued $320.0 million aggregate principal amount of convertible senior notes due 2022 (the "2022 Convertible Notes"). We received net proceeds of $310.4 million from the sale of the 2022 Convertible Notes, after deducting fees and expenses of $9.6 million. The 2022 Convertible Notes are senior unsecured obligations and bear interest at a rate of 3.25% per year, payable semi-annually in arrears on June 1 and December 1 of each year, beginning on December 1, 2017. The 2022 Convertible Notes will mature on June 1, 2022, unless earlier repurchased or converted. Upon conversion of

the 2022 Convertible Notes, such 2022 Convertible Notes will be convertible into, at our election, cash, shares of our common stock, or a combination thereof, at a conversion rate of 36.5464 shares of common stock per $1,000 principal amount of the 2022 Convertible Notes, which corresponds to an initial conversion price of approximately $27.36 per share of our common stock. The conversion rate is subject to adjustment from time to time. The 2022 Convertible Notes were not convertible by the note holders as of December 31, 2019.

Share Repurchase Program

As of January 1, 2019, we had $20.5 million available under our previously approved share repurchase program to repurchase up to $60.0 million in shares of our common stock. In March 2019, our Board authorized additional repurchases of shares in an amount up to $20.0 million under this program. During the first quarter of 2019, we repurchased and retired 1,074,800 shares of common stock for $13.7 million. As of December 31, 2019, $26.8 million remained available for future repurchases under this program.

Contractual Obligations

Our long-term contractual obligations include commitments and estimated purchase obligations entered into in the normal course of business. These include commitments related to our operating leases, purchases of inventory and debt obligations (including interest payments). Future contractual obligations, as of December 31, 2019, are as follows (in thousands):

	Payment due by period				
	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
Lease obligations	$ 29,686	$ 4,077	$ 6,941	$ 6,476	$ 12,192
Purchase commitments	105,903	31,373	39,009	29,829	5,692
2022 Convertible Notes	346,000	10,400	335,600	—	—
Total	$ 481,589	$ 45,850	$ 381,550	$ 36,305	$ 17,884

Lease Obligations

We are a party to operating leases for real estate, including our lease for use as our principal executive offices, vehicles and office equipment. Refer to Note P, "*Commitments and Contingencies*" to our consolidated financial statements included in this Annual Report on Form 10-K for more information on our lease obligations.

Purchase Obligations

Purchase obligations primarily represent minimum purchase commitments for inventory. As of December 31, 2019, our minimum purchase commitments totaled $105.9 million.

Contingent Regulatory and Commercial Milestone Payments

We are required to make payments contingent on the achievement of certain regulatory and/or commercial milestones under the terms of our collaboration, license and other strategic agreements. Please refer to Note Q, "*Collaboration, License and Other Strategic Agreements*" to our consolidated financial statements included in this Annual Report on Form 10-K for more information regarding these contingent payments.

Employment Arrangements

We have entered into employment agreements or other arrangements with most of our executive officers and certain other employees, which provide for the continuation of salary and certain benefits and, in certain instances, the acceleration of the vesting of certain equity awards to such individuals in the event that the individual is terminated other than for cause, as defined in the applicable employment agreements or arrangements.

Indemnification Obligations

In the course of operating our business, we have entered into a number of indemnification arrangements under which we may be required to make payments to or on behalf of certain third parties including our directors, officers, and certain employees as well as certain other third parties with whom we enter into agreements. For further discussion of how this may

affect our business, see Note P, "*Commitments and Contingencies,*" to our consolidated financial statements included in this Annual Report on Form 10-K.

Legal Proceedings

For detailed information on our legal proceedings, see Note P, "*Commitments and Contingencies,*" to our consolidated financial statements included in this Annual Report on Form 10-K.

Off-Balance Sheet Arrangements

As of December 31, 2019, we did not have any off-balance sheet arrangements as defined in Regulation S-K, Item 303(a)(4)(ii).

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA:

Index To Consolidated Financial Statements

MANAGEMENT'S ANNUAL REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING (RESTATED)

Management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Securities and Exchange Act of 1934, as amended. Our internal control over financial reporting is a process designed under the supervision of our principal executive officer and principal financial officer to provide reasonable assurance regarding the reliability of financial reporting and the preparation of our financial statements for external purposes in accordance with U.S. generally accepted accounting principles. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Our management, including our principal executive officer and principal financial officer, assessed the effectiveness of our internal control over financial reporting as of December 31, 2019. In making this assessment, our management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in *Internal Control - Integrated Framework* (2013). A material weakness is a deficiency, or combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the Company's annual or interim financial statements will not be prevented or detected on a timely basis. The Company did not design and maintain effective internal controls related to ensuring the timely recognition of our gross-to-net ("GTN") adjustments for certain governmental rebates and the related accruals. Specifically, we did not design and maintain controls to allow for an effective review of disputed claims related to certain government rebate arrangements, where the decision has been made to initially not record and accrue for such items, to assess whether and when the need to record an accrual is required for such claims. This control deficiency resulted in a misstatement of the Company's product sales, net, and accrued expenses, and the revision of the Company's previously issued annual and interim consolidated financial statements as of and for the years ended December 31, 2019, 2018 and 2017 and for each of the interim periods in 2019 and 2018. Additionally, this control deficiency could result in a misstatement of the aforementioned account balances or disclosures that would result in a material misstatement to the annual or interim consolidated financial statements that would not be prevented or detected. Therefore, management has concluded that this control deficiency constitutes a material weakness.

In Management's Annual Report on Internal Control over Financial Reporting included in the Original 10-K, our management previously concluded that the Company maintained effective internal control over financial reporting as of December 31, 2019. Subsequent to the filing date of the Original 10-K, management has concluded that the material weakness described above existed as of December 31, 2019. As a result, we have concluded that we did not maintain effective internal control over financial reporting as of December 31, 2019 based on the criteria set forth by COSO in *Internal Control -Integrated Framework (2013)*. Accordingly, management has restated its annual report on internal control over financial reporting.

The effectiveness of the Company's internal control over financial reporting as of December 31, 2019, has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report, which is included in "Item 8. Financial Statements and Supplementary Data" of this Amendment.

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of AMAG Pharmaceuticals, Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of AMAG Pharmaceuticals, Inc. and its subsidiaries (the "Company") as of December 31, 2019 and 2018, and the related consolidated statements of operations, comprehensive loss, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2019, including the related notes (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company did not maintain, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO because a material weakness in internal control over financial reporting existed as of that date related to the timely recognition of the Company's gross-to-net adjustments for certain governmental rebates and the related accruals. Specifically, the Company did not design and maintain controls to allow for an effective review of disputed claims related to certain government rebate arrangements, where the decision has been made to initially not record and accrue for such items, to assess whether and when the need to record an accrual is required for such claims.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the annual or interim financial statements will not be prevented or detected on a timely basis. The material weakness referred to above is described in the accompanying Management's Annual Report on Internal Control over Financial Reporting. We considered this material weakness in determining the nature, timing, and extent of audit tests applied in our audit of the 2019 consolidated financial statements, and our opinion regarding the effectiveness of the Company's internal control over financial reporting does not affect our opinion on those consolidated financial statements.

Restatement of Management's Conclusion Regarding Internal Control over Financial Reporting

Management and we previously concluded that the Company maintained effective internal control over financial reporting as of December 31, 2019. However, management has subsequently determined that a material weakness in internal control over financial reporting existed as of that date related to the timely recognition of the Company's gross-to-net adjustments for certain governmental rebates and the related accruals as discussed above. Accordingly, management's report has been restated and our present opinion on internal control over financial reporting, as presented herein, is different from that expressed in our previous report.

Changes in Accounting Principles

As discussed in Note W to the consolidated financial statements, the Company changed the manner in which it accounts for leases in 2019 and the manner in which it accounts for share-based compensation in 2017.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in management's report referred to above. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement,

whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ PricewaterhouseCoopers LLP

Boston, Massachusetts
March 6, 2020, except for the effects of the revision discussed in Note X to the consolidated financial statements and the matter discussed in the second paragraph of Management's Annual Report on Internal Control over Financial Reporting, as to which the date is September 15, 2020

We served as the Company's auditor from 1982 to 2020.

AMAG PHARMACEUTICALS, INC.
CONSOLIDATED BALANCE SHEETS
(IN THOUSANDS, EXCEPT SHARE AND PER SHARE DATA)

	As of December 31,	
	2019	**2018**
ASSETS		
Current assets:		
Cash and cash equivalents	$ 113,009	$ 253,256
Marketable securities	58,742	140,915
Accounts receivable, net	94,163	75,347
Inventories	31,553	26,691
Prepaid and other current assets	19,100	18,961
Note receivable	—	10,000
Total current assets	316,567	525,170
Property and equipment, net	4,116	7,521
Goodwill	422,513	422,513
Intangible assets, net	23,620	217,033
Operating lease right-of-use asset	23,286	—
Deferred tax assets	630	1,260
Restricted cash	495	495
Other long-term assets	—	1,467
Total assets	$ 791,227	$ 1,175,459
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 27,021	$ 14,487
Accrued expenses	183,382	134,635
Current portion of convertible notes, net	—	21,276
Current portion of operating lease liability	4,077	—
Current portion of acquisition-related contingent consideration	17	144
Total current liabilities	214,497	170,542
Long-term liabilities:		
Convertible notes, net	277,034	261,933
Long-term operating lease liability	19,791	—
Long-term acquisition-related contingent consideration	—	215
Other long-term liabilities	89	1,212
Total liabilities	511,411	433,902
Commitments and Contingencies (Note P)		
Stockholders' equity:		
Preferred stock, par value $0.01 per share, 2,000,000 shares authorized; none issued	—	—
Common stock, par value $0.01 per share, 117,500,000 shares authorized; 33,999,081 and 34,606,760 shares issued and outstanding at December 31, 2019 and December 31, 2018, respectively	339	346
Additional paid-in capital	1,297,917	1,292,736
Accumulated other comprehensive loss	(3,239)	(3,985)
Accumulated deficit	(1,015,201)	(547,540)
Total stockholders' equity	279,816	741,557
Total liabilities and stockholders' equity	$ 791,227	$ 1,175,459

The accompanying notes are an integral part of these consolidated financial statements.

AMAG PHARMACEUTICALS, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
(IN THOUSANDS, EXCEPT PER SHARE DATA)

	Years Ended December 31,		
	2019	2018	2017
Revenues:			
Product sales, net	$ 309,985	$ 471,898	$ 493,843
Collaboration revenue	16,400	—	—
Other revenues	161	150	124
Total revenues	326,546	472,048	493,967
Costs and expenses:			
Cost of product sales	107,193	215,892	161,349
Research and development expenses	64,853	44,846	75,017
Acquired in-process research and development	74,856	32,500	65,845
Selling, general and administrative expenses	286,600	227,810	178,151
Impairment of assets	232,336	—	319,246
Restructuring expenses	7,420	—	—
Total costs and expenses	773,258	521,048	799,608
Operating loss	(446,712)	(49,000)	(305,641)
Other income (expense):			
Interest expense	(25,709)	(51,971)	(68,382)
Loss on debt extinguishment	—	(35,922)	(10,926)
Interest and dividend income	4,285	5,328	2,810
Other income (expense)	428	(74)	(70)
Total other expense, net	(20,996)	(82,639)	(76,568)
Loss from continuing operations before income taxes	(467,708)	(131,639)	(382,209)
Income tax (benefit) expense	(47)	40,436	(175,521)
Net loss from continuing operations	$ (467,661)	$ (172,075)	$ (206,688)
Discontinued operations:			
Income from discontinued operations	$ —	$ 18,873	$ 10,313
Gain on sale of CBR business	—	87,076	—
Income tax expense	—	2,371	4,388
Net income from discontinued operations	$ —	$ 103,578	$ 5,925
Net loss	$ (467,661)	$ (68,497)	$ (200,763)
Basic and diluted earnings per share:			
Loss from continuing operations	$ (13.74)	$ (5.00)	$ (5.92)
Income from discontinued operations	—	3.01	0.17
Total	$ (13.74)	$ (1.99)	$ (5.75)
Weighted average shares outstanding used to compute earnings per share (basic and diluted):	34,030	34,394	34,907

The accompanying notes are an integral part of these consolidated financial statements.

AMAG PHARMACEUTICALS, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(IN THOUSANDS)

	Years Ended December 31,		
	2019	2018	2017
Net loss	$ (467,661)	$ (68,497)	$ (200,763)
Other comprehensive income (loss)			
Holding gains (losses) arising during period, net of tax	746	(77)	(70)
Total comprehensive loss	$ (466,915)	$ (68,574)	$ (200,833)

The accompanying notes are an integral part of these consolidated financial statements.

AMAG PHARMACEUTICALS, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(IN THOUSANDS, EXCEPT SHARES)

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2016	34,336,147	$ 343	$ 1,238,031	$ (3,838)	$ (300,974)	$ 933,562
Settlement of warrants	—	—	323	—	—	323
Equity component of the 2022 Convertible Notes, net of issuance costs and taxes	—	—	43,236	—	—	43,236
Cumulative effect of previously unrecognized excess tax benefits related to stock compensation	—	—	—	—	21,558	21,558
Equity component of debt repurchase	—	—	(27,988)	—	—	(27,988)
Shares issued in connection with Endoceutics License Agreement	600,000	6	13,494	—	—	13,500
Repurchase and retirement of common stock pursuant to the 2016 Share Repurchase Program	(1,366,266)	(14)	(19,453)	—	—	(19,467)
Issuance of common stock under employee stock purchase plan	120,580	1	1,593	—	—	1,594
Net shares issued in connection with the exercise of stock options and vesting of restricted stock units, net of withholdings	392,651	5	(1,272)	—	—	(1,267)
Non-cash equity based compensation	—	—	23,664	—	—	23,664
Unrealized losses on securities, net of tax	—	—	—	(70)	—	(70)
Net loss	—	—	—	—	(200,763)	(200,763)
Balance at December 31, 2017	34,083,112	341	1,271,628	(3,908)	(480,179)	787,882
ASC 606 adoption adjustment, net of tax	—	—	—	—	1,136	1,136
Net shares issued in connection with the exercise of stock options and vesting of restricted stock units, net of withholdings	463,776	4	275	—	—	279
Issuance of common stock under employee stock purchase plan	59,872	1	917	—	—	918
Non-cash equity based compensation	—	—	19,916	—	—	19,916
Unrealized losses on securities, net of tax	—	—	—	(77)	—	(77)
Net loss	—	—	—	—	(68,497)	(68,497)
Balance at December 31, 2018	34,606,760	346	1,292,736	(3,985)	(547,540)	741,557
Net shares issued in connection with the exercise of stock options and vesting of restricted stock units, net of withholdings	281,184	3	(1,803)	—	—	(1,800)
Issuance of common stock under employee stock purchase plan	185,937	1	1,505	—	—	1,506
Repurchase of common stock pursuant to the share repurchase program	(1,074,800)	(11)	(13,719)	—	—	(13,730)
Non-cash equity based compensation	—	—	19,198	—	—	19,198
Unrealized gains on securities, net of tax	—	—	—	746	—	746
Net loss	—	—	—	—	(467,661)	(467,661)
Balance at December 31, 2019	33,999,081	$ 339	$ 1,297,917	$ (3,239)	$ (1,015,201)	$ 279,816

The accompanying notes are an integral part of these consolidated financial statements.

AMAG PHARMACEUTICALS, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(IN THOUSANDS)

	Years Ended December 31,		
	2019	**2018**	**2017**
Cash flows from operating activities:			
Net loss	$ (467,661)	$ (68,497)	$ (200,763)
Adjustments to reconcile net loss to net cash (used in) provided by operating activities:			
Depreciation and amortization	27,324	172,223	155,538
Impairment of long-lived assets	232,336	—	319,246
Provision for bad debt expense	—	678	3,852
Amortization of premium/discount on purchased securities	(95)	87	302
Write-down of inventory	19,767	5,176	—
(Gain) loss on disposal of fixed assets	—	(99)	265
Non-cash equity-based compensation expense	19,198	19,916	23,664
Non-cash IPR&D expense	18,029	—	945
Loss on debt extinguishment	—	35,922	10,926
Amortization of debt discount and debt issuance costs	15,242	15,658	14,395
(Gain) loss on sale of marketable securities, net	(265)	(1)	70
Change in fair value of contingent consideration	(270)	(49,607)	(47,686)
Deferred income taxes	404	41,948	(178,688)
Non-cash lease expense	2,725	—	—
Gain on sale of the CBR business	—	(87,076)	—
Transaction costs	—	(14,111)	—
Changes in operating assets and liabilities:			
Accounts receivable, net	(18,816)	16,995	(14,978)
Inventories	(19,253)	(454)	(2,331)
Prepaid and other current assets	(113)	(6,097)	(2,222)
Accounts payable and accrued expenses	53,952	(30,614)	18,636
Deferred revenues	(6,400)	8,658	17,080
Payment of contingent consideration in excess of acquisition date fair value	—	—	(10,432)
Other assets and liabilities	(1,800)	95	(1,223)
Net cash (used in) provided by operating activities	(125,696)	60,800	106,596
Cash flows from investing activities:			
Proceeds from sales or maturities of marketable securities	98,321	85,342	294,957
Purchases of marketable securities	(14,815)	(89,956)	(127,249)
Milestone payment for Vyleesi developed technology	(60,000)	—	—
Acquisition of Intrarosa intangible asset	—	—	(55,800)
Proceeds from the sale of the CBR business	—	519,303	—
Note receivable	—	(10,000)	—
Capital expenditures	(2,544)	(2,534)	(8,988)
Net cash provided by investing activities	20,962	502,155	102,920

The accompanying notes are an integral part of these consolidated financial statements.

AMAG PHARMACEUTICALS, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS (Continued)
(IN THOUSANDS)

	Years Ended December 31,		
	2019	**2018**	**2017**
Cash flows from financing activities:			
Long-term debt principal payments	—	(475,000)	(353,125)
Proceeds from 2022 Convertible Notes	—	—	320,000
Payments to repurchase 2019 Convertible Notes	(21,417)	—	(191,730)
Payment of premium on debt extinguishment	—	(28,054)	(625)
Proceeds to settle warrants	—	—	323
Payment of convertible debt issuance costs	—	—	(9,553)
Payment of contingent consideration	(72)	(119)	(39,793)
Payments for repurchases of common stock	(13,730)	—	(19,466)
Proceeds from the issuance of common stock under the ESPP	1,506	—	—
Proceeds from the exercise of common stock options	30	3,881	3,021
Payments of employee tax withholding related to equity-based compensation	(1,830)	(2,682)	(2,696)
Net cash used in financing activities	(35,513)	(501,974)	(293,644)
Net (decrease) increase in cash, cash equivalents and restricted cash	(140,247)	60,981	(84,128)
Cash, cash equivalents and restricted cash at beginning of the year	253,751	192,770	276,898
Cash, cash equivalents and restricted cash at end of the year	$ 113,504	$ 253,751	$ 192,770
Supplemental data of cash flow information:			
Cash (refunded) paid for taxes	$ (202)	$ 5,345	$ 5,296
Cash paid for interest	$ 10,667	$ 48,757	$ 56,959
Non-cash investing and financing activities:			
Right-of-use assets obtained in exchange for lease obligations	$ 18,455	$ —	$ —
Settlement of note receivable in connection with Perosphere acquisition	$ 10,000	$ —	$ —
Fair value of common stock issued in connection with the acquisition of the Intrarosa intangible asset	$ —	$ —	$ 12,555
Contingent consideration accrued for the acquisition of the Intrarosa intangible asset	$ —	$ —	$ 9,300

The accompanying notes are an integral part of these consolidated financial statements.

AMAG PHARMACEUTICALS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

A. DESCRIPTION OF BUSINESS

AMAG Pharmaceuticals, Inc., a Delaware corporation, was founded in 1981. We are a pharmaceutical company focused on bringing innovative products to patients with unmet medical needs by leveraging our development and commercial expertise to invest in and grow our pharmaceutical products across a range of therapeutic areas. Our currently marketed products support the health of patients in the areas of hematology and maternal and women's health, including Feraheme® (ferumoxytol injection) for intravenous use, Makena® (hydroxyprogesterone caproate injection) auto-injector, Intrarosa® (prasterone) vaginal inserts and Vyleesi®(bremelanotide injection). In addition to our marketed products, our portfolio includes two product candidates, AMAG-423 (digoxin immune fab (ovine)), which is being studied for the treatment of severe preeclampsia, and ciraparantag, which is being studied as an anticoagulant reversal agent.

In March 2019, we announced topline results from the Progestin's Role in Optimizing Neonatal Gestation clinical trial ("PROLONG" or "Trial 003"), a randomized, double-blinded, placebo-controlled clinical trial evaluating Makena in patients with a history of a prior spontaneous singleton preterm delivery. The PROLONG trial was conducted under the U.S. Food and Drug Administration's (the "FDA") "Subpart H" accelerated approval process. The approval of Makena was based primarily on the Meis trial ("Trial 002"), which was conducted by the Maternal-Fetal Medicine Units Network, sponsored by the National Institute of Child Health and Human Development. In contrast to the Meis trial, the PROLONG trial did not demonstrate a statistically significant difference between the treatment and placebo arms for the co-primary endpoints. On October 29, 2019, the Advisory Committee met to discuss the results of the PROLONG trial to inform the FDA's regulatory decision for Makena. Following various presentations by experts and discussions at the meeting, the FDA's Bone, Reproductive and Urologic Drugs Advisory Committee (the "Advisory Committee") voted as follows: (a) in response to the question "Do the findings from Trial 003 verify the clinical benefits of Makena on neonatal outcomes?", 16 members voted "No" and no members voted "Yes"; (b) in response to the question "Based on the findings from Trial 002 and Trial 003, is there substantial evidence of effectiveness of Makena in reducing the risk of recurrent preterm birth?", 13 members voted "No" and three members voted "Yes"; and (c) in response to the question, "Should the FDA (A) pursue withdrawal of approval for Makena, (B) leave Makena on the market under accelerated approval and require a new confirmatory trial, or (C) leave Makena on the market without requiring a new confirmatory trial?", nine members voted for (A), seven members voted for (B) and no members voted for (C). The FDA is not required to follow the recommendations of its Advisory Committees, but will take them into consideration in deciding what regulatory steps to take with respect to Makena. We are unable to predict the outcome or timing of any FDA action with respect to Makena.

In December 2019 we completed a review of our product portfolio and strategy. This strategic review resulted in our intention to divest Intrarosa® (prasterone) and Vyleesi® (bremelanotide), as announced in January 2020. We determined that these anticipated actions did not result in the related assets meeting the criteria to be recorded as held of sale at December 31, 2019.

We are subject to risks common to companies in the pharmaceutical industry including, but not limited to (as such risks pertain to our business) the impact of any action by the FDA with respect to Makena, including the potential of the removal of Makena's approval, our ability to successfully divest Intrarosa and Vyleesi, our ability to successfully commercialize our products, intense competition, including from generic products; maintaining and defending the proprietary nature of our technology, including in the event that Sandoz launches a generic version of Feraheme in accordance with the 2018 settlement agreement; our dependence upon third-party manufacturers and our potential inability to obtain raw or other materials and impacts of supply shortages; our reliance on and the extent of reimbursement from third parties for the use of our products, including the impact of generic competitors, Makena's high Medicaid reimbursement concentration; our ability to expand our product portfolio through business development transactions; the approval of our product candidates and our ability to commercialize such products, if approved; potential litigation, including securities and product liability suits; our ability to work effectively and collaboratively with our licensors and partners; our reliance on other third parties in our business, including to conduct our clinical trials and undertake our product and distribution; our ability to maintain, attract and retain key employees; our potential failure to comply with federal and state healthcare fraud and abuse laws, marketing disclosure laws, or other federal and state laws and regulations and potential civil or criminal penalties as a result thereof; uncertainties regarding reporting and payment obligations under government pricing programs; post-approval commitments for Feraheme; our ability to comply with data protection laws and regulations; the impact of disruptions to our information technology systems; our level of and ability to repay our indebtedness; our access to sufficient capital; the availability of net operating loss carryforwards and other tax assets; potential differences between actual future results and the estimates or assumptions used by us in preparation of our consolidated financial statements, including goodwill and intangible assets; the volatility of our stock price; the potential

fluctuation of our operating results; and provisions in our charter, by-laws and certain contracts that discourage an acquisition of our company.

Throughout this Annual Report on Form 10-K, AMAG Pharmaceuticals, Inc. and our consolidated subsidiaries are collectively referred to as "the Company," "AMAG," "we," "us," or "our."

B. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Presentation and Principles of Consolidation

The accompanying consolidated financial statements have been prepared in conformity with accounting principles generally accepted in the U.S. ("GAAP") and include the accounts of our wholly-owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation.

As of June 30, 2018, our CBR business met the criteria to be classified as a discontinued operation. All historical operating results for CBR are reflected within discontinued operations in the consolidated statements of operations for the years ended December 31, 2018 and 2017. For additional information, see Note C, "*Discontinued Operations.*"

Use of Estimates and Assumptions

The preparation of consolidated financial statements in conformity with GAAP requires management to make certain estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses, and the related disclosure of contingent liabilities. The most significant estimates and assumptions are used to determine amounts and values of, but are not limited to: revenue recognition related to product sales revenue; product sales allowances and accruals; allowance for doubtful accounts; marketable securities; inventory; acquisition date fair value and subsequent fair value estimates used to assess impairment of long-lived assets, including goodwill and other intangible assets; debt obligations; certain accrued liabilities, including clinical trial accruals; equity-based compensation expense, and income taxes, inclusive of valuation allowances. Actual results could differ materially from those estimates.

Revenue Recognition

Product revenues

On January 1, 2018, we adopted Accounting Standards Codification ("ASC") Topic 606, *Revenue from Contracts with Customers* ("ASC 606") applying the modified retrospective transition method to all contracts that were not completed as of January 1, 2018 as an adjustment of $1.1 million to the opening balance of stockholders' equity at the beginning of 2018. The adjustment recorded was for incremental contract acquisition costs related to the CBR business. Results for reporting periods beginning after January 1, 2018 are presented under ASC 606, while prior period amounts are not adjusted and continue to be reported under the accounting standards in effect for prior periods. There was no impact to our product revenue as a result of adoption.

Under ASC 606, we recognize revenue when our customer obtains control of promised goods or services in an amount that reflects the consideration which we expect to receive in exchange for those goods or services. To determine revenue recognition for arrangements that we determine are within the scope of ASC 606, we perform the following five steps:

a. Identify the contract(s) with a customer;
b. Identify the performance obligations in the contract;
c. Determine the transaction price;
d. Allocate the transaction price to the performance obligations in the contract; and
e. Recognize revenue when (or as) the performance obligations are satisfied.

We only apply the five step model to contracts when it is probable that we will collect the consideration we are entitled to in exchange for the goods or services we transfer to the customer. At contract inception, if the contract is determined to be within the scope of ASC 606, we assess the goods or services promised within each contract, determine those that are performance obligations, and assess whether each promised good or service is distinct. We then recognize as revenue the amount of the transaction price that is allocated to the respective performance obligation when (or as) the performance obligation is satisfied.

Our major sources of revenue during the reporting periods were product revenues from Makena, Feraheme and Intrarosa. The adoption of ASC 606 in 2018 did not have an impact on the pattern or timing of recognition of our product revenue, as the majority of our product revenue continues to be recognized when the customer takes control of our product.

We receive payments from customers based upon contractual billing schedules; accounts receivable are recorded when the right to consideration becomes unconditional.

Performance Obligations

At contract inception, we assess the goods promised in our contracts with customers and identify a performance obligation for each promise to transfer to the customer a good (or bundle of goods) that is distinct. To identify the performance obligations, we consider all of the goods promised in the contract regardless of whether they are explicitly stated or are implied by customary business practices. We determined that the following distinct goods represent separate performance obligations:

- Supply of Makena product
- Supply of Feraheme product
- Supply of Intrarosa product
- Supply of Vyleesi product

We principally sell our products to wholesalers, specialty distributors, specialty pharmacies and other customers (collectively, "Customers"), who purchase products directly from us. Our Customers subsequently resell the products to healthcare providers and patients. In addition to distribution agreements with Customers, we enter into arrangements with healthcare providers and payers that provide for government-mandated and/or privately-negotiated rebates, chargebacks and discounts with respect to the purchase of our products.

For the majority of our Customers, we transfer control at the point in time when the goods are delivered. In instances when we perform shipping and handling activities, these are considered fulfillment activities, and accordingly, the costs are accrued when the related revenue is recognized. Taxes collected from Customers and remitted to governmental authorities are excluded from revenues.

Variable Consideration

Under ASC 606, we are required to make estimates of the net sales price, including estimates of variable consideration (such as rebates, chargebacks, discounts, copay assistance and other deductions), and recognize the estimated amount as revenue, when we transfer control of the product to our customers. Variable consideration must be determined using either an "expected value" or a "most likely amount" method.

We record product revenues net of certain allowances and accruals in our consolidated statements of operations. Product sales allowances and accruals are primarily comprised of both direct and indirect fees, discounts and rebates and provisions for estimated product returns. Direct fees, discounts and rebates are contractual fees and price adjustments payable to Customers that purchase products directly from us. Indirect fees, discounts and rebates are contractual price adjustments payable to healthcare providers and organizations, such as certain physicians, clinics, hospitals, group purchasing organizations ("GPOs"), and dialysis organizations that typically do not purchase products directly from us but rather from wholesalers and specialty distributors. Consideration payable to a Customer, or other parties that purchase goods from a Customer, are considered to be a reduction of the transaction price, and therefore, of revenue.

Product sales allowances and accruals are based on definitive contractual agreements or legal requirements (such as laws and regulations to provide mandatory discounts for sales to government entities) related to the purchase and/or utilization of the product by these entities and are recorded in the same period that the related revenue is recognized. We use the expected value method for estimating variable consideration. We estimate product sales allowances and accruals using either historical, actual and/or other data, including estimated patient usage, applicable contractual rebate rates, contract performance by the benefit providers, other current contractual and statutory requirements, historical market data based upon experience of our products and other products similar to them, specific known market events and trends such as competitive pricing and new product introductions, current and forecasted Customer buying patterns and inventory levels, and the shelf life of our products. As part of this evaluation, we also review changes to federal and other legislation, changes to rebate contracts, changes in the level of discounts, and changes in product sales trends. Although allowances and accruals are recorded at the time of product sale, rebates are typically paid out in arrears, one to three months after the sale.

The estimate of variable consideration, which is included in the transaction price, may be constrained and is included in the net sales price only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved in a future period. Estimating variable consideration and the related constraint requires the use of significant management judgment and actual amounts of consideration ultimately received may differ from our estimates. If actual results in the future vary from our estimates, we will adjust these estimates, which would affect net product revenue and earnings in the period such variances become known. No amounts were constrained as of December 31, 2019.

Discounts

We typically offer a 2% prompt payment discount to certain customers as an incentive to remit payment in accordance with the stated terms of the invoice, generally between 30 to 60 days. Because we anticipate that those customers who are offered this discount will take advantage of the discount, 100% of the prompt payment discount at the time of sale is accrued for eligible customers, based on the gross amount of each invoice. We adjust the accrual quarterly to reflect actual experience.

Chargebacks

Chargeback reserves represent the estimated obligations resulting from the difference between the prices at which we sell our products to wholesalers and the sales price ultimately paid to wholesalers under fixed price contracts by third-party payers, including governmental agencies. The chargeback estimates are determined based on actual product sales data and forecasted customer buying patterns. Actual chargeback amounts are determined at the time of resale to the qualified healthcare provider, and we generally issue credits for such amounts within several weeks of receiving notification from the wholesaler. Estimated chargeback amounts are recorded at the time of sale and adjusted quarterly to reflect actual experience.

Distributor/Wholesaler and Group Purchasing Organization Fees

Fees under arrangements with distributors and wholesalers are usually based upon units of product purchased during the prior month or quarter and are usually paid by us within several weeks of the receipt of an invoice from the wholesaler or distributor. Fees under arrangements with GPOs are usually based upon member purchases during the prior quarter and are generally billed by the GPO within 30 days after period end. In accordance with ASC 606, since the consideration given to the Customer is not for a distinct good or service, the consideration is a reduction of the transaction price of the vendor's products or services. We have included these fees in contractual adjustments in the table above. We generally pay such amounts within several weeks of the receipt of an invoice from the distributor, wholesaler or GPO. Accordingly, we accrue the estimated fee due at the time of sale, based on the contracted price invoiced to the Customer. We adjust the accrual quarterly to reflect actual experience.

Product Returns

Consistent with industry practice, we generally offer wholesalers, specialty distributors and other customers a limited right to return our products based on the product's expiration date. The current shelf-lives or time between manufacture and expiration for products in our portfolio range from three to five years. Product returns are estimated based on the historical return patterns and known or expected changes in the marketplace. We track actual returns by individual production lots. Returns on lots eligible for credits under our returned goods policy are monitored and compared with historical return trends and rates. We expect that wholesalers and healthcare providers will not stock significant inventory due to the cost of the product, the expense to store our products, and/or that our products are readily available for distribution. We record an estimate of returns at the time of sale. If necessary, our estimated rate of returns may be adjusted for actual return experience as it becomes available and for known or expected changes in the marketplace. There were no material adjustments to our reserve for product returns during the years ended December 31, 2019, 2018 or 2017. To date, our product returns have been relatively limited; however, returns experience may change over time. We may be required to make future adjustments to our product returns estimate, which would result in a corresponding change to our net product sales in the period of adjustment and could be significant.

Sales Rebates

We contract with various private payer organizations, primarily pharmacy benefit managers, for the payment of rebates with respect to utilization of our products. We determine our estimates for rebates, if applicable, based on actual product sales data and our historical product claims experience. Rebate amounts generally are invoiced quarterly and are paid in arrears, and we expect to pay such amounts within several weeks of notification by the provider. We regularly assess our reserve balance and the rate at which we accrue for claims against product sales. If we determine in future periods that our actual rebate

experience is not indicative of expected claims, if actual claims experience changes, or if other factors affect estimated claims rates, we may be required to adjust our current accumulated reserve estimate, which would affect net product sales in the period of the adjustment and could be significant.

Governmental Rebates

Governmental rebates relate to our reimbursement arrangements with state Medicaid programs. We determine our estimates for Medicaid rebates, if applicable, based on actual product sales data and our historical product claims experience. In estimating these reserves, we provide for a Medicaid rebate associated with both those expected instances where Medicaid will act as the primary insurer as well as in those instances where we expect Medicaid will act as the secondary insurer. Rebate amounts generally are invoiced quarterly and are paid in arrears, and we expect to pay such amounts within several weeks of notification by the Medicaid or provider entity. We regularly assess our Medicaid reserve balance and the rate at which we accrue for claims against product sales. If we determine in future periods that our actual rebate experience is not indicative of expected claims, if actual claims experience changes, or if other factors affect estimated claims rates, we may be required to adjust our current Medicaid accumulated reserve estimate, which would affect net product sales in the period of the adjustment and could be significant.

Other Discounts

Other discounts which we offer include voluntary patient assistance programs, such as copay assistance programs, which are intended to provide financial assistance to qualified commercially insured patients with prescription drug copayments required by payers. The calculation of the accrual for copay assistance is based on an estimate of claims and the cost per claim that we expect to receive associated with product that has been recognized as revenue.

Collaboration Revenues

When we enter into collaboration agreements, we assess whether the agreements fall within the scope of ASC Topic 808, *Collaborative Arrangements* (“ASC 808”) based on whether the arrangements involve joint operating activities and whether both parties have active participation in the arrangement and are exposed to significant risks and rewards. To the extent that the arrangement falls within the scope of ASC 808, we assess whether the payments between us and our collaboration partner fall within the scope of other accounting literature. If we conclude that payments from the collaboration partner to us represent consideration from a customer, such as license fees and contract research and development activities, we account for those payments within the scope of ASC 606. However, if we conclude that our collaboration partner is not a customer for certain activities and associated payments, such as for certain collaborative research, development, manufacturing and commercial activities, we present such payments as a reduction of research and development expense or general and administrative expense, based on where we present the related underlying expense.

Cash and Cash Equivalents

Cash and cash equivalents consist principally of cash held in commercial bank accounts, money market funds and U.S. treasury securities having an original maturity of less than three months at the date of acquisition. We consider all highly liquid marketable securities with a maturity of three months or less as of the acquisition date to be cash equivalents. At December 31, 2019 and 2018, substantially all of our cash and cash equivalents were held in either commercial bank accounts or money market funds.

Concentrations and Significant Customer Information

Financial instruments which potentially subject us to concentrations of credit risk consist principally of cash and cash equivalents, marketable securities, and accounts receivable. We currently hold our excess cash primarily in institutional money market funds, corporate debt securities, U.S. treasury and government agency securities and certificates of deposit. As of December 31, 2019, we did not have a material concentration in any single investment.

Our operations are located entirely within the U.S. We focus primarily on developing, manufacturing, and commercializing our products and product candidates. The following table sets forth customers who represented 10% or more of our total revenues for 2019, 2018 and 2017:

	Years Ended December 31,		
	2019	2018	2017
McKesson Corporation	36%	26%	24%
AmerisourceBergen Drug Corporation	28%	27%	26%
Cardinal Health	13%	< 10%	< 10%

Our net accounts receivable primarily represent amounts due for products sold directly to wholesalers, distributors and specialty pharmacies. Accounts receivable for our products are recorded net of reserves for estimated chargeback obligations, prompt payment discounts and any allowance for doubtful accounts.

As part of our credit management policy, we perform ongoing credit evaluations of our customers, and we generally do not require collateral. If the financial condition of any of our significant product sales customers was to deteriorate and result in an impairment of its ability to make payments owed to us, an allowance for doubtful accounts may be required which could have a material effect on earnings in the period of any such adjustment. We did not experience any significant bad debts and have not established an allowance for doubtful accounts as of December 31, 2019 and 2018.

At December 31, 2019 and 2018, three customers accounted for 10% or more of our accounts receivable balance, representing approximately 85% and 73% in the aggregate of our total accounts receivable, respectively.

We are currently dependent on a single supplier for certain of our manufacturing processes, including Feraheme drug substance (produced in two separate facilities) and a single supplier for our Makena auto-injector product. We have been and may continue to be exposed to a significant loss of revenue from the sale of our products in the event that our suppliers and/or manufacturers are not able to fulfill demand for any reason.

Fair Value Measurements

We apply the provisions of ASC Topic 820, *Fair Value Measurements* (“ASC 820”) for our financial assets and liabilities that are re-measured and reported at fair value each reporting period and our nonfinancial assets and liabilities that are re-measured and reported at fair value on a non-recurring basis, including property and equipment and identifiable intangible assets. Fair value is the price that would be received from selling an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. When determining fair value, we consider the principal or most advantageous market in which it would transact and consider assumptions that market participants would use when pricing the asset or liability. ASC 820 establishes a three-level valuation hierarchy for disclosure of fair value measurements. Financial assets and liabilities are categorized within the valuation hierarchy based upon the lowest level of input that is significant to the measurement of fair value. The three levels of the hierarchy are defined as follows:

- Level 1- Inputs to the valuation methodology are quoted market prices for identical assets or liabilities.
- Level 2 - Inputs to the valuation methodology are other observable inputs, including quoted market prices for similar assets or liabilities and market-corroborated inputs.
- Level 3 - Inputs to the valuation methodology are unobservable inputs based on management’s best estimate of inputs market participants would use in pricing the asset or liability at the measurement date, including assumptions about risk.

Marketable Securities

We account for and classify our marketable securities as either “available-for-sale,” “held-to-maturity,” or “trading debt securities,” in accordance with the accounting guidance related to the accounting and classification of certain investments in marketable securities. The determination of the appropriate classification by us is based primarily on management’s ability and intent to sell the debt security at the time of purchase. As of December 31, 2019 and 2018, all of our marketable securities were classified as available-for-sale.

Available-for-sale securities are those securities which we view as available for use in current operations, if needed. We generally classify our available-for-sale securities as short-term investments, even though the stated maturity date may be one year or more beyond the current balance sheet date. Available-for-sale marketable securities are stated at fair value with their

unrealized gains and losses included in accumulated other comprehensive income (loss) within the consolidated statements of stockholders' equity, until such gains and losses are realized in other income (expense) within the consolidated statements of operations or until an unrealized loss is considered other-than-temporary.

We recognize other-than-temporary impairments of our marketable securities when there is a decline in fair value below the amortized cost basis and if (a) we have the intent to sell the security or (b) it is more likely than not that we will be required to sell the security prior to recovery of its amortized cost basis. If either of these conditions is met, we recognize the difference between the amortized cost basis of the security and its fair value at the impairment measurement date in our consolidated statements of operations. If neither of these conditions is met, we must perform additional analysis to evaluate whether the unrealized loss is associated with the creditworthiness of the issuer of the security rather than other factors, such as interest rates or market factors. If we determine from this analysis that we do not expect to receive cash flows sufficient to recover the entire amortized cost of the security, a credit loss exists, the impairment is considered other-than-temporary and is recognized in our consolidated statements of operations.

Inventory

Inventory is stated at the lower of cost or net realizable value, with approximate cost being determined on a first-in, first-out basis. Prior to initial approval from the FDA or other regulatory agencies, we expense costs relating to the production of inventory in the period incurred, unless we believe regulatory approval and subsequent commercialization of the product candidate is probable and we expect the future economic benefit from sales of the product to be realized, at which point we capitalize the costs as inventory. We assess any costs capitalized prior to regulatory approval each quarter for indicators of impairment, such as a reduced likelihood of approval. We expense costs associated with clinical trial material as research and development expense.

On a quarterly basis, we analyze our inventory levels to determine whether we have any obsolete, expired, or excess inventory. If any inventory is expected to expire prior to being sold, has a cost basis in excess of its net realizable value, is in excess of expected sales requirements as determined by internal sales forecasts, or fails to meet commercial sale specifications, the inventory is written-down through a charge to cost of product sales. The determination of whether inventory costs will be realizable requires estimates by management of future expected inventory requirements, based on sales forecasts. Once packaged, our products have a shelf-life ranging from three to five years. As a result of comparison to internal sales forecasts, we expect to fully realize the carrying value of our finished goods inventory. If actual market conditions are less favorable than those projected by management, inventory write-downs may be required. Charges for inventory write-downs are not reversed if it is later determined that the product is saleable.

Property and Equipment, Net

Property and equipment are recorded at cost and depreciated when placed into service using the straight-line method based on their estimated useful lives as follows:

	Useful Life
Computer equipment and software	5 Years
Furniture and fixtures	5 Years
Leasehold improvements	Lesser of Lease or Asset Life
Laboratory and production equipment	5 Years

Costs for capital assets not yet placed in service are capitalized on our balance sheets and will be depreciated in accordance with the above guidelines once placed into service. Costs for maintenance and repairs are expensed as incurred. Upon sale or other disposition of property and equipment, the cost and related depreciation are removed from the accounts and any resulting gain or loss is charged to our consolidated statements of operations. Assets classified as held for sale are no longer subject to depreciation and are recorded at the lower of carrying value or estimated net realizable value.

Intangible Assets

We amortize our intangible assets that have finite lives based on either the straight-line method, or if reliably determinable, based on the pattern in which the economic benefit of the asset is expected to be utilized.

If we acquire an asset or a group of assets that do not meet the definition of a business, the acquired IPR&D is expensed on its acquisition date. Future costs to develop these assets are recorded to research and development expense as they are incurred.

Impairment of Long-Lived Assets

We review our long-lived assets, which includes property and equipment and identifiable intangible assets for impairment whenever events or changes in circumstances indicate that the carrying value of an asset or asset group may not be recoverable. To evaluate recoverability, management compares the projected undiscounted future cash flows associated with the asset or asset group, including proceeds from its eventual disposition over its estimated useful life against its carrying amount. If the undiscounted cash flows are not sufficient to recover the carrying value of the asset or asset group, the asset or asset group is considered impaired. The impairment loss, if any, is measured as the excess of the carrying amount of the asset or asset group over its estimated fair value, which is typically calculated utilizing a discounted cash flow ("DCF") model following the same methodology as described in the following section.

Goodwill

We test goodwill at the reporting unit level for impairment on an annual basis and between annual tests if events and circumstances indicate it is more likely than not that the fair value of a reporting unit is less than its carrying value. Events that could indicate impairment and trigger an interim impairment assessment include, but are not limited to, an adverse change in current economic and market conditions, including a significant prolonged decline in market capitalization, a significant adverse change in legal factors, unexpected adverse business conditions, and an adverse action or assessment by a regulator. Our annual impairment test date is October 31. We have determined that we operate in a single operating segment and have a single reporting unit.

In performing our goodwill impairment tests, we utilize the approach prescribed under Accounting Standards Codification ("ASC") 350, as amended by Accounting Standards Update ("ASU") 2017-04, *Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment* ("ASU 2017-04"), which requires that an entity perform its annual, or interim, goodwill impairment test by comparing the fair value of a reporting unit with its carrying amount. An entity should recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value.

When we perform any goodwill impairment test, the estimated fair value of our reporting unit is determined using an income approach that utilizes a DCF model or a market approach, when appropriate, which assesses our market capitalization as adjusted for a control premium, or a combination thereof.

Under the market approach, when our carrying value exceeds our market capitalization, we consider a control premium for purposes of estimating the fair value of our reporting unit, as we believe that a market participant buyer would be required to pay a control premium for our business. The control premium utilized is based on control premiums observed in recent comparable market transactions. As described in the accounting guidance for evaluating long-lived assets for impairment, an entity's fair value may include a control premium in addition to the quoted market price to determine the fair value of a single reporting unit entity, as an acquiring entity is often willing to pay more for equity securities that give it a controlling interest than an investor would pay for a number of equity securities representing less than a controlling interest. This accounting guidance also indicates that the quoted market price of an individual security need not be the sole measurement basis of the fair value of a single reporting unit. When our market capitalization exceeds our carrying value, we utilize our market capitalization as the indicator of fair value in our impairment test.

Under the income approach, the DCF model is based upon expected future after-tax operating cash flows of the reporting unit discounted to a present value using a risk-adjusted discount rate. Estimates of future cash flows require management to make significant assumptions concerning (i) future operating performance, including future sales, long-term growth rates, operating margins, variations in the amount and timing of cash flows and the probability of achieving the estimated cash flows (ii) the probability of regulatory approvals, and (iii) future economic conditions, all of which may differ from actual future cash flows. These assumptions are based on significant inputs not observable in the market and thus represent Level 3 measurements within the fair value hierarchy. The discount rate, which is intended to reflect the risks inherent in future cash flow projections, used in the DCF model, is based on estimates of the weighted average cost of capital ("WACC") of market participants relative to our reporting unit. Financial and credit market volatility can directly impact certain inputs and assumptions used to develop the WACC. Any changes in these assumptions may affect our fair value estimate and the result of an impairment test. The discount rates and other inputs and assumptions are consistent with those that a market participant would use. In addition, in order to assess the reasonableness of the fair value of our reporting unit as calculated under the DCF model, we also compare the reporting unit's fair value to our market capitalization and calculate an implied control premium (the excess sum of the reporting unit's fair value over its market capitalization). We evaluate the implied control premium by comparing it to control premiums of recent comparable market transactions, as applicable.

Business Combinations and Asset Acquisitions

The purchase price allocation for business combinations requires extensive use of accounting estimates and judgments to allocate the purchase price to the identifiable tangible and intangible assets acquired and liabilities assumed based on their respective fair values. Under ASU No. 2017-01, "*Business Combinations (Topic 805): Clarifying the Definition of a Business* ("2017-01"), we first determine whether substantially all of the fair value of the gross assets acquired is concentrated in a single identifiable asset or a group of similar identifiable assets. If this threshold is met, the single asset or group of assets, as applicable, is not a business.

We account for acquired businesses using the acquisition method of accounting, under which the total purchase price of an acquisition is allocated to the net tangible and identifiable intangible assets acquired and liabilities assumed based on their estimated fair values as of the acquisition date. Acquisition-related costs are expensed as incurred. Any excess of the consideration transferred over the estimated fair values of the identifiable net assets acquired is recorded as goodwill.

The purchase price allocations for business combinations are initially prepared on a preliminary basis and are subject to change as additional information becomes available concerning the fair value and tax basis of the assets acquired and liabilities assumed. Any adjustments to the purchase price allocations are made as soon as practicable but no later than one year from the acquisition date.

Acquired inventory is recorded at its fair value, which may require a step-up adjustment to recognize the inventory at its expected net realizable value. The inventory step-up is recorded to cost of product sales in our consolidated statements of operations when related inventory is sold, and we record step-up costs associated with clinical trial material as research and development expense.

Acquisition-Related Contingent Consideration

Contingent consideration arising from a business combination is included as part of the purchase price and is recognized at its estimated fair value as of the acquisition date. Subsequent to the acquisition date, we measure contingent consideration arrangements at fair value for each period until the contingency is resolved. These changes in fair value are recognized in selling, general and administrative expenses in our consolidated statements of operations. Changes in fair values reflect new information about the likelihood of the payment of the contingent consideration and the passage of time. For asset acquisitions, we record contingent consideration for obligations we consider to be probable and estimable and these liabilities are not adjusted to fair value.

Leases

Effective January 1, 2019, we adopted ASC Topic 842, *Leases* ("ASC 842"), and chose to apply the provisions of ASC 842 as of the effective date with no restatement of prior periods or cumulative adjustment to retained earnings. Upon adoption, we elected to utilize the package of transition practical expedients, which allowed us to carry forward prior conclusions related to whether any expired or existing contracts are or contain leases, the lease classification for any expired or existing leases and initial direct costs for existing leases. We also made accounting policy elections to not separate lease and non-lease components for our real estate lease and to not recognize leases with an initial term of twelve months or less within our consolidated balance sheets and to recognize those lease payments on a straight-line basis on our consolidated statements of income over the lease term. We did not have any material short-term leases accounted for under this policy during the year ended December 31, 2019.

We determine if an arrangement is a lease at inception. Operating leases are included in operating lease right-of-use ("ROU") assets, current portion of operating lease liability, and long-term operating lease liability on our consolidated balance sheets. ROU assets represent our right to use an underlying asset for the lease term and operating lease liabilities represent our obligation to make lease payments arising from the lease.

ROU assets and operating lease liabilities are recognized based on the present value of the future minimum lease payments over the lease term at the commencement date. As our leases do not provide an implicit rate, we use our incremental borrowing rate based on the information available at the commencement date in determining the present value of future payments. Our incremental borrowing rate is determined based on an evaluation of our creditworthiness and the prevailing market rates for collateralized debt with maturity dates commensurate with the term of each lease. Our lease terms may include options to extend or terminate the lease when it is reasonably certain that we will exercise the option. Lease expense for operating leases is recognized on a straight-line basis over the lease term.

The lease payments used to determine our ROU assets may include lease incentives, stated rent increases, and escalation clauses linked to rates of inflation when determinable and are recognized in our ROU assets on our consolidated balance sheet. In addition, certain lease agreements contain lease and non-lease components. With the exception of our real estate leases, we separate lease payments for the identified assets from any non-lease payments included in the agreement. For our real estate leases, we account for the lease and non-lease components as a single lease component. Additionally, for vehicle and certain equipment leases, we apply a portfolio approach to effectively account for the related ROU assets and operating lease liabilities.

Restricted Cash

We classified $0.5 million of our cash as restricted cash, a non-current asset on the balance sheet, as of December 31, 2019 and 2018. This amount represented the security deposit delivered to the landlord of our Waltham, Massachusetts headquarters.

Research and Development Expenses

Research and development expenses include both external and internal expenses. External expenses primarily include costs of clinical trials and fees paid to contract research organizations ("CROs"), clinical supply and manufacturing expenses, regulatory filing fees, consulting and professional fees as well as other general costs related to the execution of research and development activities. Internal expenses primarily include compensation of employees engaged in research and development activities. Research and development expenses are expensed as incurred. Manufacturing costs are generally expensed as incurred until a product has received the necessary initial regulatory approval.

Patents

We expense all patent-related costs in selling, general and administrative expenses as incurred.

Advertising Costs

Advertising costs are expensed as incurred and included in selling, general and administrative expenses in our consolidated statements of operations. Advertising costs, including promotional expenses, costs related to digital marketing and print media advertising space were $53.3 million, $29.8 million and $9.1 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Equity-Based Compensation

Equity-based compensation cost is generally measured at the estimated grant date fair value and recorded to expense over the requisite service period, which is generally the vesting period. Because equity-based compensation expense is based on awards ultimately expected to vest, we must make certain judgments about whether employees, officers, directors, consultants and advisers will complete the requisite service period, and reduce the compensation expense being recognized for estimated forfeitures. Forfeitures are estimated at the time of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates. Forfeitures are estimated based upon historical experience and adjusted for unusual events such as corporate restructurings, which can result in higher than expected turnover and forfeitures. If factors change and we employ different assumptions in future periods, the compensation expense that we record in the future may differ significantly from what we have recorded in the current period.

We estimate the fair value of equity-based compensation involving stock options based on the Black-Scholes option pricing model. This model requires the input of several factors such as the expected option term, the expected risk-free interest rate over the expected option term, the expected volatility of our stock price over the expected option term and the expected dividend yield over the expected option term and are subject to various assumptions. The fair value of awards calculated using the Black-Scholes option pricing model is generally amortized on a straight-line basis over the requisite service period, and is recognized based on the proportionate amount of the requisite service period that has been rendered during each reporting period.

We estimate the fair value of our restricted stock units ("RSUs") whose vesting is contingent upon market conditions, such as total shareholder return, using the Monte-Carlo simulation model. The fair value of RSUs where vesting is contingent upon market conditions is amortized based upon the estimated derived service period. The fair value of RSUs granted to our employees and directors whose vesting is dependent on future service is determined based upon the quoted closing market price per share on the date of grant, adjusted for estimated forfeitures.

We believe our valuation methodologies are appropriate for estimating the fair value of the equity awards we grant to our employees and directors. Our equity award valuations are estimates and may not be reflective of actual future results or amounts ultimately realized by recipients of these grants. These amounts are subject to future quarterly adjustments based upon a variety of factors, which include, but are not limited to, changes in estimated forfeiture rates and the issuance of new equity-based awards.

Income Taxes

We use the asset and liability method of accounting for deferred income taxes. Under this method, deferred tax assets and liabilities are recognized for the estimated future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. A deferred tax asset is established for the expected future benefit of net operating loss ("NOL") and credit carryforwards. Deferred tax assets and liabilities are measured using enacted rates in effect for the year in which those temporary differences are expected to be recovered or settled. A valuation allowance against net deferred tax assets is required if, based on available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized. Significant judgments, estimates and assumptions regarding future events, such as the amount, timing and character of income, deductions and tax credits, are required in the determination of our provision for income taxes and whether valuation allowances are required against deferred tax assets. In evaluating our ability to recover our deferred tax assets, we consider all available evidence, both positive and negative, including the existence of taxable temporary differences, our past operating results, the existence of cumulative income in the most recent fiscal years, changes in the business in which we operate and our forecast of future taxable income. In determining future taxable income, we are responsible for assumptions utilized including the amount of state and federal operating income, the reversal of temporary differences and the implementation of feasible and prudent tax planning strategies. These assumptions require significant judgment about the forecasts of future taxable income. As of December 31, 2019, we have established a valuation allowance on our net deferred tax assets other than refundable alternative minimum tax ("AMT") credits to the extent that our existing taxable temporary differences would not be available as a source of income to realize the benefits of those deferred tax assets.

We account for uncertain tax positions using a "more-likely-than-not" threshold for recognizing and resolving uncertain tax positions. The evaluation of uncertain tax positions is based on factors that include, but are not limited to, changes in tax law, the measurement of tax positions taken or expected to be taken in tax returns, the effective settlement of matters subject to audit, new audit activity, and changes in facts or circumstances related to a tax position. We evaluate uncertain tax positions on a quarterly basis and adjust the level of the liability to reflect any subsequent changes in the relevant facts surrounding the uncertain positions. Any changes to these estimates, based on the actual results obtained and/or a change in assumptions, could impact our income tax provision in future periods. Interest and penalty charges, if any, related to unrecognized tax benefits would be classified as a provision for income tax in our consolidated statement of operations.

Comprehensive Loss

Our comprehensive loss consists of net loss and other comprehensive loss. Other comprehensive loss includes changes in equity that are excluded from net loss, which for all periods presented in these consolidated financial statements related to unrealized holding gains and losses on available-for-sale marketable securities, net of tax.

Basic and Diluted Earnings per Share

We compute basic earnings per share by dividing earnings by the weighted average number of common shares outstanding during the relevant period. Diluted earnings per share is computed by dividing earnings by the diluted number of common shares outstanding during the period. Except where the result would be antidilutive, diluted earnings per common share would be computed assuming the impact of the conversion of the 3.25% convertible senior notes due in 2022 (the "2022 Convertible Notes"), the exercise of outstanding stock options and the vesting of RSUs.

We have a choice to settle the conversion obligation of our 2022 Convertible Notes (the "2022 Convertible Notes") in cash, shares or any combination of the two. Our policy is to settle the principal balance of the 2022 Convertible Notes in cash. As such, we apply the treasury stock method to these securities and the dilution related to the conversion premium, if any, of the 2022 Convertible Notes is included in the calculation of diluted weighted-average shares outstanding to the extent the issuance is dilutive based on the average stock price during each reporting period being greater than the conversion price of the 2022 Convertible Notes.

The components of basic and diluted earnings per share for 2019, 2018 and 2017 were as follows (in thousands, except per share data):

	Years Ended December 31,		
	2019	2018	2017
Net loss from continuing operations	$ (467,661)	$ (172,075)	$ (206,688)
Net income from discontinued operations	—	103,578	5,925
Weighted average common shares outstanding	34,030	34,394	34,907
Effect of dilutive securities:			
Stock options and RSUs	—	—	—
Shares used in calculating dilutive net loss per share	34,030	34,394	34,907
Basic and diluted earnings per share:			
Loss from continuing operations	$ (13.74)	$ (5.00)	$ (5.92)
Income from discontinued operations	—	3.01	0.17
Total	$ (13.74)	$ (1.99)	$ (5.75)

The following table sets forth the potential common shares issuable upon the exercise of outstanding options, the vesting of RSUs and the conversion of the Convertible Notes (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Options to purchase shares of common stock	3,976	3,797	3,531
Shares of common stock issuable upon the vesting of RSUs	1,579	1,129	1,070
Warrants	—	1,008	1,008
2022 Convertible Notes	11,695	11,695	11,695
2019 Convertible Notes	—	790	790
Shares of common stock under employee stock purchase plan	—	81	—
Total	17,250	18,500	18,094

In connection with the issuance of the 2019 Convertible Notes, in February 2014, we entered into convertible bond hedges with certain financial institutions. The convertible bond hedges were not included for purposes of calculating the number of diluted shares outstanding, as their effect would be anti-dilutive. The convertible bond hedges and warrants expired in February 2019 in conjunction with the settlement of the 2019 Convertible Notes.

Business Segments

We have determined that we conduct our operations in one business segment: the manufacture, development and commercialization of products for use in treating various conditions, with a focus on maternal and women's health and anemia management. Long-lived assets consist entirely of intangible assets, property and equipment and are located in the U.S. for all periods presented.

Immaterial Revision of Prior Period Financial Information

Prior period amounts, specifically net product sales and accrued expenses have been revised to correct a prior period error related to gross-to-net ("GTN") adjustments for governmental rebates and the related accrual for a certain state program. Refer to Note X, *"Revision of Prior Period Financial Statements"* for further detail.

C. DISCONTINUED OPERATIONS

On August 6, 2018, we completed the sale of our CBR business to GI Partners pursuant to the CBR Purchase Agreement. We determined that the sale of CBR represented a strategic shift that would have a major effect on our business and therefore met the criteria for classification as discontinued operations at June 30, 2018. All historical operating results for CBR were reflected within discontinued operations in the consolidated statements of operations for the years ended December 31, 2018 and 2017.

The following is a summary of net income from discontinued operations for the years ended December 31, 2018 and 2017:

	Years Ended December 31,	
	2018	2017
Service revenues, net	$ 71,217	$ 114,177
Costs and expenses:		
Cost of services	12,559	21,817
Selling, general and administrative expenses	39,899	81,782
Total costs and expenses	52,458	103,599
Operating income	18,759	10,578
Other income (expense)	114	(265)
Income from discontinued operations	18,873	10,313
Gain on sale of CBR business	87,076	—
Income tax expense	2,371	4,388
Net income from discontinued operations	$ 103,578	$ 5,925

The cash flows related to discontinued operations have not been segregated and are included in the consolidated statements of cash flows for the years ended December 31, 2018 and 2017. For the years ended December 31, 2018 and 2017, capital expenditures related to the CBR business were $1.6 million and $4.9 million, respectively. Depreciation and amortization expense related to the CBR business for the same periods was $8.4 million and $21.7 million, respectively. Excluding the gain of $87.1 million recognized on the sale of the CBR business and the related transaction expenses of $14.1 million presented in the consolidated statements of cash flows for the year ended December 31, 2018, there were no other significant operating or investing non-cash items related to the CBR business for any period presented.

D. REVENUE RECOGNITION

Product Revenue

The following table provides information about disaggregated revenue by product for the years ended December 31, 2019, 2018 and 2017 (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Product sales, net			
Makena	$ 120,859	$ 320,311	$ 385,356
Feraheme	167,947	135,001	105,930
Intrarosa	21,417	16,218	1,816
Other	(238)	368	741
Total	$ 309,985	$ 471,898	$ 493,843

Total gross product sales were offset by product sales allowances and accruals for the years ended December 31, 2019, 2018 and 2017 as follows (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Gross product sales	$ 955,693	$ 974,330	$ 920,061
Provision for product sales allowances and accruals:			
Contractual adjustments	530,645	387,540	310,588
Governmental rebates	115,063	114,892	115,630
Total	645,708	502,432	426,218
Product sales, net	$ 309,985	$ 471,898	$ 493,843

The following table summarizes the product revenue allowance and accrual activity for the years ended December 31, 2019, 2018 and 2017 (in thousands):

	Contractual Adjustments	Governmental Rebates	Total
Balance at January 1, 2017	**$ 47,600**	**$ 52,741**	**$ 100,341**
Current provisions relating to sales in current year	314,537	113,969	428,506
Adjustments relating to sales in prior years	(3,949)	1,661	(2,288)
Payments/returns relating to sales in current year	(253,545)	(61,569)	(315,114)
Payments/returns relating to sales in prior years	(42,479)	(53,060)	(95,539)
Balance at December 31, 2017	**62,164**	**53,742**	**115,906**
Current provisions relating to sales in current year	389,861	106,988	496,849
Adjustments relating to sales in prior years	(2,330)	7,903	5,573
Payments/returns relating to sales in current year	(333,694)	(75,920)	(409,614)
Payments/returns relating to sales in prior years	(58,802)	(58,501)	(117,303)
Balance at December 31, 2018	**57,199**	**34,212**	**91,411**
Provisions related to current period sales	521,916	100,926	622,842
Adjustments related to prior period sales	8,774	14,137	22,911
Payments/returns relating to current period sales	(431,014)	(60,218)	(491,232)
Payments/returns relating to prior period sales	(61,654)	(41,435)	(103,089)
Balance at December 31, 2019	**$ 95,221**	**$ 47,622**	**$ 142,843**

During the year ended December 31, 2019, we recorded adjustments of $14.1 million for Medicaid rebate claims received that related to prior period sales and $8.8 million for contractual adjustments related to prior period sales. We concluded that these adjustments represented changes in estimate during the year ended December 31, 2019 due to higher Medicaid and payer utilization and subsequent rebate obligations than anticipated based on our historical experience.

Collaboration Revenue

During the first quarter of 2019, in conjunction with the Perosphere transaction, we assumed responsibility for a clinical trial collaboration agreement with a pharmaceutical company. This agreement provided for milestone payments to us, provided we met certain clinical obligations in connection with our ciraparantag program. We also acquired $6.4 million of deferred revenue related to this agreement, which represented the fair value of our remaining performance obligations associated with upfront milestone payments received by Perosphere under this agreement prior to acquisition. We accounted for this agreement under ASC 606.

During the fourth quarter of 2019, we entered into a termination and settlement agreement (the “Termination Agreement”) with the pharmaceutical company which provided for a $10.0 million termination payment to us and stated that no party had any remaining performance obligations effective as of the termination date. The $10.0 million termination payment was received during the fourth quarter of 2019. Under ASC 606, the Termination Agreement met the definition of a contract modification and was accounted for as a cumulative catch-up adjustment at the time of modification.

During the year ended December 31, 2019, the $10.0 million termination payment and $6.4 million of deferred revenue were recognized as collaboration revenue in our consolidated statements of operations.

E. MARKETABLE SECURITIES

As of December 31, 2019 and 2018, our marketable securities consisted of securities classified as available-for-sale in accordance with accounting standards which provide guidance related to accounting and classification of certain investments in marketable securities.

The following is a summary of our marketable securities as of December 31, 2019 and 2018 (in thousands):

	December 31, 2019			
Description of Securities:	**Amortized Cost**	**Gross Unrealized Gains**	**Gross Unrealized Losses**	**Estimated Fair Value**
Short-term investments:*				
Corporate debt securities	$ 46,186	$ 140	$ (2)	$ 46,324
U.S. treasury and government agency securities	2,750	—	—	2,750
Certificates of deposit	1,500	—	—	1,500
Total short-term investments	50,436	140	(2)	50,574
Long-term investments:**				
Corporate debt securities	8,016	152	—	8,168
Total long-term investments	8,016	152	—	8,168
Total investments	$ 58,452	$ 292	$ (2)	$ 58,742

	December 31, 2018			
Description of Securities:	**Amortized Cost**	**Gross Unrealized Gains**	**Gross Unrealized Losses**	**Estimated Fair Value**
Short-term investments:*				
Corporate debt securities	$ 51,184	$ —	$ (236)	$ 50,948
U.S. treasury and government agency securities	7,647	—	(34)	7,613
Commercial paper	3,995	—	—	3,995
Certificates of deposit	12,000	—	—	12,000
Total short-term investments	74,826	—	(270)	74,556
Long-term investments:**				
Corporate debt securities	62,530	52	(433)	62,149
U.S. treasury and government agency securities	2,742	—	(32)	2,710
Certificates of deposit	1,500	—	—	1,500
Total long-term investments	66,772	52	(465)	66,359
Total investments	$ 141,598	$ 52	$ (735)	$ 140,915

* Represents marketable securities with a remaining maturity of less than one year.
** Represents marketable securities with a remaining maturity of one to three years classified as short-term on our consolidated balance sheets.

Impairments and Unrealized Gains and Losses on Marketable Securities

We did not recognize any other-than-temporary impairment losses in our consolidated statements of operations related to our marketable securities during 2019, 2018 or 2017. We considered various factors, including the length of time that each security was in an unrealized loss position and our ability and intent to hold these securities until recovery of their amortized cost basis occurs. As of December 31, 2019, we have no material losses in an unrealized loss position for more than one year. Future events may occur, or additional information may become available, which may cause us to identify credit losses where we do not expect to receive cash flows sufficient to recover the entire amortized cost basis of a security and may necessitate the recording of future realized losses on securities in our portfolio. Significant losses in the estimated fair values of our marketable securities could have a material adverse effect on our earnings in future periods.

F. FAIR VALUE MEASUREMENTS

The following tables present information about our assets and liabilities that we measure at fair value on a recurring basis and indicate the level within the fair value hierarchy of the valuation techniques utilized to determine such fair value as of December 31, 2019 and 2018 (in thousands):

	Fair Value Measurements at December 31, 2019 Using:			
	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents	$ 13,732	$ 13,732	$ —	$ —
Corporate debt securities	54,492	—	54,492	—
U.S. treasury and government agency securities	2,750	—	2,750	—
Certificates of deposit	1,500	—	1,500	—
Total Assets	$ 72,474	$ 13,732	$ 58,742	$ —
Liabilities:				
Contingent consideration	17	—	—	17
Total Liabilities	$ 17	$ —	$ —	$ 17

	Fair Value Measurements at December 31, 2018 Using:			
	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents	$ 71,568	$ 71,568	$ —	$ —
Corporate debt securities	113,097	—	113,097	—
U.S. treasury and government agency securities	10,323	—	10,323	—
Commercial paper	3,995	—	3,995	—
Certificates of deposit	13,500	—	13,500	—
Total Assets	$ 212,483	$ 71,568	$ 140,915	$ —
Liabilities:				
Contingent consideration	359	—	—	359
Total Liabilities	$ 359	$ —	$ —	$ 359

Cash equivalents

Our cash equivalents are classified as Level 1 assets under the fair value hierarchy as these assets have been valued using quoted market prices in active markets and do not have any restrictions on redemption. As of December 31, 2019 and 2018, cash equivalents were comprised of funds in money market accounts.

Marketable securities

Our marketable securities are classified as Level 2 assets under the fair value hierarchy as these assets were primarily determined from independent pricing services, which normally derive security prices from recently reported trades for identical or similar securities, making adjustments based upon other significant observable market transactions. At the end of each reporting period, we perform quantitative and qualitative analysis of prices received from third parties to determine whether prices are reasonable estimates of fair value. After completing our analysis, we did not adjust or override any fair value measurements provided by our pricing services as of December 31, 2019 or 2018. In addition, there were no transfers or reclassifications of any securities between Level 1 and Level 2 during 2019 or 2018.

Contingent consideration

In accordance with GAAP, for asset acquisitions, we record contingent consideration for obligations we consider to be probable and estimable and these liabilities are not adjusted to fair value. As of December 31, 2019 and December 31, 2018, no contingent consideration was recorded in accrued expenses.

We recorded contingent consideration related to the November 2014 acquisition of Lumara Health Inc. ("Lumara Health") for our Makena product and related to our June 2013 license agreement for MuGard® Mucoadhesive Oral Wound Rinse (the "MuGard License Agreement") with Abeona Therapeutics, Inc. ("Abeona"), under which we acquired the U.S. commercial rights for the management of oral mucositis and stomatitis (the "MuGard Rights").

The fair value measurements of contingent consideration obligations and the related intangible assets arising from business combinations are classified as Level 3 under the fair value hierarchy as they have been valued using unobservable inputs. These inputs include: (a) the estimated amount and timing of projected cash flows; (b) the probability of the achievement of the factors on which the contingency is based; and (c) the risk-adjusted discount rate used to present value the probability-weighted cash flows. Significant increases or decreases in any of those inputs in isolation could result in a significantly lower or higher fair value measurement.

During 2018, we reduced the fair value of our contingent consideration liability by approximately $49.6 million, primarily based on actual Makena net sales to date and our expectations for future performance, which indicated that achievement of future milestones is not probable. This adjustment was based on our estimates, which are reliant on a number of external factors as well as the exercise of judgment.

We believe the estimated fair values of the contingent payments associated with Lumara Health and the MuGard Rights are based on reasonable assumptions, however, our actual results may vary significantly from the estimated results.

Debt

We estimate the fair value of our debt obligations by using quoted market prices obtained from third-party pricing services, which is classified as a Level 2 input. As of December 31, 2019, the estimated fair value of the 2022 Convertible Notes was $274.8 million, which differed from its carrying value. As of December 31, 2018, the estimated fair value of the 2022 Convertible Notes and the 2019 Convertible Notes was $294.8 million and $20.9 million, respectively, which differed from their carrying values. See Note R, "*Debt,*" for additional information on our debt obligations.

Nonrecurring Fair Value Measurements

During the year ended December 31, 2019, we measured the Makena base technology, Makena auto-injector developed technology, Intrarosa developed technology and Vyleesi developed technology intangible assets at fair value based on indicators of impairment identified for the Makena, Intrarosa and Vyleesi products. The aggregate fair values of our intangible assets at December 31, 2019 was $23.6 million and we recorded total impairment charges of $232.3 million in our consolidated statements of operations for the year ended December 31, 2019. The fair value measurement related to the Makena base technology intangible asset was recorded during the second quarter of 2019. The Makena auto-injector developed technology intangible asset was measured at fair value as of October 29, 2019 and the Intrarosa developed technology and Vyleesi developed technology intangible assets were measured at fair value as of December 31, 2019. See Note I, "*Goodwill and Intangible Assets, Net*" for additional information regarding our intangible asset impairment assessments.

G. INVENTORIES

Our major classes of inventories were as follows as of December 31, 2019 and 2018 (in thousands):

	December 31,	
	2019	2018
Raw materials	$ 5,211	$ 9,388
Work in process	6,248	5,932
Finished goods	20,094	11,371
Total inventories	$ 31,553	$ 26,691

During the year ended December 31, 2019, we recorded inventory write-downs of $19.8 million in conjunction with the impairments of the asset groups related to the Makena intramuscular ("IM") products and the Makena auto-injector product.

H. PROPERTY AND EQUIPMENT, NET

Property and equipment, net consisted of the following as of December 31, 2019 and 2018 (in thousands):

	December 31,	
	2019	2018
Computer equipment and software	$ 1,568	$ 1,637
Furniture and fixtures	1,714	1,737
Leasehold improvements	4,984	2,938
Laboratory and production equipment	6,570	6,000
Construction in progress	656	420
	15,492	12,732
Less: accumulated depreciation	(11,376)	(5,211)
Property and equipment, net	$ 4,116	$ 7,521

During 2019, 2018 and 2017, depreciation expense was $2.6 million, $1.6 million, and $1.2 million, respectively.

I. GOODWILL AND INTANGIBLE ASSETS, NET

Goodwill

Our $422.5 million goodwill balance represents goodwill of the continuing business following the goodwill allocation performed in 2018 in connection with the CBR transaction discussed in Note C, *"Discontinued Operations."* As of December 31, 2019, we had no accumulated impairment losses related to goodwill.

2019 Impairment Testing Results

On October 31, 2019 (the "2019 measurement date"), we conducted our 2019 annual goodwill impairment test using a market approach to estimate the fair value of our reporting unit as of the 2019 measurement date. We considered our market capitalization, as adjusted for a control premium, to be one indicator of the fair value of our reporting unit. On October 31, 2019, our stock price closed at $9.71 per share, resulting in a market capitalization of approximately $329 million, which was below the carrying amount of our reporting unit as of the 2019 measurement date, resulting in an implied control premium of 6%. During the fourth quarter of 2019, we obtained a control premium analysis that benchmarked average control premiums paid in prior merger and acquisition transactions among biotechnology and pharmaceutical companies. The analysis indicated that control premiums vary depending on facts and circumstances for each transaction. The range of control premiums observed was between 37% and 84%, with a median of 65%. Management believes that using this market approach of assessing reasonable control premiums provided a sufficient basis to assess whether the fair value of our reporting unit, including a range of reasonable control premiums, was above its carrying amount. Incorporating control premiums in this range to our October 31, 2019 market capitalization of $329 million resulted in a fair value which was at least 29% greater (at the low end of the range) than the carrying amount of our net assets as of October 31, 2019. As a result of this review, we determined that there was no impairment of our goodwill at October 31, 2019.

Between October 31, 2019 and December 31, 2019, in accordance with ASC 350, we evaluated business factors, including the business decision to divest Intrarosa and Vyleesi, to determine whether there were indicators that the fair value of our reporting unit was less than its carrying value. We determine that it was not more likely than not that the fair value of the reporting unit was less than its carrying value and accordingly, determined that there was no impairment of goodwill at December 31, 2019.

Based on our assessment, we determined that there was no goodwill impairment at October 31, 2019 or December 31, 2019. However, the future occurrence of events including, but are not limited to, an adverse change in current economic and market conditions, including a significant prolonged decline in market capitalization, a significant adverse change in legal factors, unexpected adverse business conditions and an adverse action or assessment by a regulator could indicate potential impairment and trigger an interim impairment assessment of goodwill. As a result of the significance of goodwill, our results of operations and financial position in a future period could be negatively impacted should an impairment test be triggered that results in an impairment of goodwill.

2018 Impairment Testing Results

During the second quarter of 2018, in conjunction with the goodwill allocation required by the CBR transaction and in accordance with ASC 350, we performed a goodwill impairment test to assess whether there were indicators that its fair value was less than its carrying value. As a result of this evaluation, we determined that there was no impairment of goodwill at June 30, 2018.

On October 31, 2018 (the "2018 measurement date"), we conducted our 2018 annual goodwill impairment test using a market approach to estimate the fair value of our reporting unit as of the 2018 measurement date. We considered our market capitalization, as adjusted for a control premium, to be one indicator of the fair value of our reporting unit. On October 31, 2018, our stock price closed at $21.50 per share, resulting in a market capitalization of approximately $742 million, which was below the carrying amount of our reporting unit as of the 2018 measurement date, resulting in an implied control premium of 2%. In the days following our October 31, 2018 annual testing date, our stock price declined, largely in response to our November 1, 2018 earnings release and Company update. This decline resulted in a market capitalization of approximately $633 million on November 5, 2018, resulting in an implied control premium of 20%. During the third quarter of 2018, we obtained an updated control premium analysis that benchmarked average control premiums paid in prior merger and acquisition transactions among biotechnology and pharmaceutical companies. The analysis indicated that control premiums vary depending on facts and circumstances for each transaction. The range of control premiums observed was between 39% and 96%, with a median of 71%. Management believes that using this market approach of assessing reasonable control premiums provided a sufficient basis to assess whether the fair value of our reporting unit, including a range of reasonable control premiums, was above its carrying amount. Incorporating control premiums in this range to our October 31, 2018 market capitalization of $742 million resulted in a fair value which was at least 36% greater (at the low end of the range) than the carrying amount of our net assets as of October 31, 2018. As a result of this review, we determined that there was no impairment of our goodwill at October 31, 2018.

Between October 31, 2018 and December 31, 2018, our stock price continued to fluctuate, with a median closing stock price of $17.84 per share for the period from November 1, 2018 through December 31, 2018. The median closing stock price of $17.84 per share resulted in a market capitalization of approximately $617 million, which as compared to the $747 million carrying amount of our reporting unit at December 31, 2018 resulted in an implied control premium of 21%. Incorporating the range of control premiums obtained from the control premium study used in our annual goodwill impairment test at October 31, 2018 to the calculated market capitalization of $617 million resulted in a fair value which was at least 15% greater (at the low end of the range) than the carrying amount of our net assets as of December 31, 2018. Using the closing stock price of $15.19 per share on December 31, 2018 results in an implied control premium of 41%. This implied control premium is within the range of control premiums observed. As a result of this review, we determined that there was no impairment of our goodwill between our annual goodwill impairment test date and December 31, 2018. In addition, we determined that there were no other indicators of impairment through December 31, 2018 requiring further assessment.

Intangible Assets

	December 31, 2019				December 31, 2018			
	Original Cost	Life to Date Accumulated Amortization	Life to Date Impairments	Net Book Value	Original Cost	Life to Date Accumulated Amortization	Life to Date Impairments	Net Book Value
Amortizable intangible assets:								
Makena base technology	$ 797,100	$ 400,496	$ 396,604	$ —	$ 797,100	$ 400,495	$ 319,246	$ 77,359
Makena auto-injector developed technology	79,100	15,782	55,426	7,892	79,100	6,952	—	72,148
Intrarosa developed technology	77,655	16,798	56,881	3,976	77,655	10,129	—	67,526
Vyleesi developed technology	60,000	9,264	38,984	11,752	—	—	—	—
Total intangible assets	$ 1,013,855	$ 442,340	$ 547,895	$ 23,620	$ 953,855	$ 417,576	$ 319,246	$ 217,033

During the second quarter of 2019, Vyleesi received FDA approval, which triggered a $60.0 million milestone payment, which was capitalized as developed technology.

Late in the second quarter of 2019, we were notified that an additional manufacturing site for the Makena IM products, which relates to the Makena base technology intangible asset, received FDA approval. However, the approval was received later than expected and the extended period of the stock-out caused our authorized generic partner to lose additional customers and market share, resulting in no shipments of IM to our authorized generic partner during that quarter. As a result of this loss of market share, we deemed it probable as of the end of the second quarter of 2019 that we would terminate the Distribution and Supply Agreement with our authorized generic partner. We do not expect to generate any future revenues from shipments

of the IM products. Accordingly, we eliminated the Makena IM products from our long-term revenue forecast during the second quarter of 2019. These business factors were considered indicators of impairment for the Makena base technology intangible asset during the second quarter of 2019. We determined that the fair value of the Makena base technology intangible asset was zero at June 30, 2019, and as a result, we recorded an impairment charge for the full remaining value of the asset of $77.4 million, which was recorded within a separate operating expense line item on our consolidated statements of operations. The Distribution and Supply Agreement with our authorized generic partner was terminated in August 2019 and we have not sold any Makena IM in the second half of 2019.

During the fourth quarter of 2019, we identified indicators of impairment for the Makena auto-injector developed technology, Intrarosa developed technology and Vyleesi developed technology intangible assets (each part of its own asset group) related to (i) the October 29, 2019 unfavorable FDA Advisory Committee recommendation for Makena as described in Note A, "*Description of Business*", and (ii) the December 2019 decision to divest Intrarosa and Vyleesi based on the strategic review that we conducted. We determined that the Intrarosa and Vyleesi asset groups did not meet the criteria to be classified as held for sale as of December 31, 2019 and as a result, assessed these assets for potential impairment under the held and used guidance. For each asset group, we estimated the sum of the undiscounted projected cash flows and found that the sum of the projected, probability-weighted undiscounted cash flows were less than the carrying value of each corresponding asset group. Therefore, we reassessed the fair value of each asset group using an income approach, a Level 3 measurement technique, which included probability weighting a range of potential outcomes as impacted by multiple significant and inter-related business factors. For all three asset groups, these significant assumptions included an estimated probability of a negative FDA action with respect to Makena and the expected timing of any such FDA action. In addition, for the Intrarosa and Vyleesi asset groups, management's assessment also included assumptions regarding the probability of completing a sale of these assets and the expected timing of a sale, should one occur. We derived these estimates based on management's judgment as informed by externally available information. We believe the assumptions we used to determine the estimated fair value of the asset groups are reasonable. Based on our consideration of these probability-weighted assumptions evaluated in the aggregate, we recorded impairment charges of $55.4 million, $56.9 million and $39.0 million to reduce the carrying values of the Makena auto-injector developed technology, Intrarosa developed technology and Vyleesi developed technology intangible assets to their respective estimated fair values. Total impairment charges of $155.0 million were recorded within a separate operating expense line item in our consolidated statements of operations during the fourth quarter of 2019, of which $151.3 million were allocated to the intangible assets in each asset group. In addition, we reassessed and prospectively adjusted the estimated remaining useful lives of the Makena auto-injector developed technology, Intrarosa developed technology and Vyleesi developed technology intangible assets and other long-lived assets within each asset group. As such, we accelerated amortization of these intangible assets resulting in an additional $7.1 million of expense recorded in 2019. As described in more detail above, our assessment was based on our estimates and assumptions, a number of which are based on external factors and the exercise of management judgment. Actual results may differ significantly from our estimates.

As of December 31, 2019, the weighted average estimated remaining amortization period for our finite-lived intangible assets was approximately one year. Total amortization expense for 2019, 2018 and 2017, was $24.8 million, $158.4 million and $130.4 million, respectively. Amortization expense is recorded in cost of product sales in our consolidated statements of operations. We expect amortization expense related to our finite-lived intangible assets to be $23.6 million during the year ended December 31, 2020.

J. CURRENT AND LONG-TERM LIABILITIES

Accrued Expenses

Accrued expenses consisted of the following as of December 31, 2019 and 2018 (in thousands):

	December 31,	
	2019	2018
Commercial rebates, fees and returns	$ 124,730	$ 85,618
Accrued manufacturing	21,364	9,282
Salaries, bonuses, and other compensation	18,693	22,482
Professional, license, and other fees and expenses	13,392	13,960
Accrued research and development	3,539	2,226
Interest expense	867	1,067
Restructuring expense	797	—
Total accrued expenses	$ 183,382	$ 134,635

K. INCOME TAXES

For the years ended December 31, 2019, 2018, and 2017, all of our profit or loss before income taxes was from U.S. operations. The income tax (benefit) expense consisted of the following (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Current:			
Federal	$ (630)	$ (1,136)	$ 2,162
State	179	1,469	5,358
Total current	$ (451)	$ 333	$ 7,520
Deferred:			
Federal	$ 432	$ 43,546	$ (172,238)
State	(28)	(3,443)	(10,803)
Total deferred	$ 404	$ 40,103	$ (183,041)
Total income tax (benefit) expense	$ (47)	$ 40,436	$ (175,521)

The reconciliation of the statutory U.S. federal income tax rate to our effective income tax rate from continuing operations was as follows:

	Years Ended December 31,		
	2019	2018	2017
Statutory U.S. federal tax rate	21.0 %	21.0 %	35.0 %
State taxes, net of federal benefit	2.6	4.7	3.3
Impact of 2017 tax reform on deferred tax balance	—	—	4.5
Equity-based compensation expense	(0.4)	(1.5)	(0.8)
Contingent consideration	—	7.1	4.4
In-process research and development	(3.4)	—	—
Other permanent items, net	(0.4)	(1.4)	(0.5)
Tax credits	0.4	6.2	0.7
Valuation allowance	(19.8)	(67.4)	(0.8)
Other, net	—	0.6	0.1
Effective tax rate	— %	(30.7)%	45.9 %

For the year ended December 31, 2019, we recognized an immaterial income tax benefit, representing an effective tax rate of 0.0%. The difference between the expected statutory federal tax rate of 21.0% and the effective tax rate of 0.0% for the year ended December 31, 2019, was primarily attributable to the valuation allowance established against our current period losses generated and the non-deductible IPR&D expense related to the Perosphere acquisition.We have established a valuation allowance on our deferred tax assets other than refundable AMT credits to the extent that our existing taxable temporary differences would not be available as a source of income to realize the benefits of those deferred tax assets. The income tax benefit for the year ended December 31, 2019 primarily related to the offset of the recognition of the income tax expense recorded in other comprehensive loss associated with the increase in the value of available-for-sale securities that we carried at fair market value during the period, partially offset by state income taxes.

For the year ended December 31, 2018, we recognized income tax expense of $40.4 million representing an effective tax rate of (30.7)%. The difference between the expected statutory federal tax rate of 21.0% and the (30.7)% effective tax rate for 2018 was primarily attributable to the establishment of a valuation allowance on net deferred tax assets other than refundable AMT credits, the impact of non-deductible stock compensation and other non-deductible expenses, partially offset by a benefit from contingent consideration associated with Lumara Health, state income taxes and orphan drug tax credits. The valuation allowance on our deferred tax assets, other than refundable AMT credits, increased during the year ended December 31, 2018 primarily because the deferred tax liabilities associated with the CBR business, which was reclassified to discontinued operations and sold during the year ended December 31, 2018, are no longer available as a source of income to realize the benefits of the net deferred tax assets.

For the year ended December 31, 2017, we recognized an income tax benefit of $175.5 million representing an effective tax rate of 45.9%. The difference between the expected statutory federal tax rate of 35.0% and the 45.9% effective tax rate for 2017 was primarily attributable to the impact of the 2017 federal tax reform legislation, as discussed below, contingent consideration associated with Lumara Health, federal research and orphan drug tax credits generated during the year, and the impact of state income taxes, partially offset by equity-based compensation expenses and an increase to our valuation allowance.

On December 22, 2017, the Tax Cuts and Jobs Act (the "2017 Tax Act"), was enacted. The 2017 Tax Act includes significant changes to the U.S. corporate income tax system, including a reduction of the federal corporate income tax rate from 35.0% to 21.0%, effective January 1, 2018. Deferred tax assets and liabilities are measured using enacted rates in effect for the year in which those temporary differences are expected to be recovered or settled. As a result of the reduction in the federal tax rate from 35.0% to 21.0%, we revalued our ending net deferred tax liabilities at December 31, 2017 and recognized a $17.1 million tax benefit.

Deferred tax assets and deferred tax liabilities are recognized based on temporary differences between the financial reporting and tax basis of assets and liabilities using future enacted rates. A valuation allowance is recorded against deferred tax assets if it is more likely than not that some or all of the deferred tax assets will not be realized. The components of our deferred tax assets and liabilities were as follows (in thousands):

	December 31,	
	2019	2018
Assets		
Net operating loss carryforwards	$ 79,679	$ 46,888
Tax credit carryforwards	28,641	24,290
Capital loss carryforwards	20,659	20,896
Interest expense carryforwards	5,746	4,318
Equity-based compensation expense	6,106	5,931
Capitalized research & development	2,347	4,635
Intangible assets	67,847	12,565
Reserves	5,721	2,683
Lease liability	5,739	—
Property, plant and equipment	391	—
Contingent consideration	4	87
Other	10,846	6,627
Valuation allowance	(218,291)	(114,516)
Liabilities		
Property, plant and equipment depreciation	—	(614)
Debt instruments	(9,195)	(12,489)
Right of use asset	(5,599)	—
Other	(11)	(41)
Net deferred tax assets	$ 630	$ 1,260

The valuation allowance increased by approximately $103.8 million for the year ended December 31, 2019. We have established a valuation allowance on our deferred tax assets other than refundable AMT credits to the extent that our existing taxable temporary differences would not be available as a source of income to realize the benefits of those deferred tax assets. Our valuation allowance on our deferred tax assets, other than refundable AMT credits, increased during the year ended December 31, 2019, primarily due to our current period losses generated.

At December 31, 2019, we had federal and state NOL carryforwards of approximately $332.8 million and $184.6 million, respectively, of which $123.1 million and $16.6 million federal and state NOL carryforwards, were acquired as part of the Lumara Health transaction, respectively, and $21.4 million and $14.6 million federal and state NOL carryforwards were acquired as part of the Perosphere transaction, respectively. The majority of the federal and state NOLs expire at various dates

through 2039. We have $127.4 million of federal NOLs generated after 2017 which will not expire. We have federal tax credits of approximately $26.1 million to offset future tax liabilities of which $2.3 million were acquired as part of the Lumara Health transaction and $2.3 million of which were acquired as part of the Perosphere transaction. We have state tax credits of $2.5 million to offset future tax liabilities of which $1.2 million were acquired as part of the Perosphere transaction. These federal and state tax credits will expire periodically through 2039 if not utilized. We have a capital loss carryforward of $90.4 million from the sale of the CBR business that can only be used to offset future capital gains and expires in 2023. Our interest expense carryforward is $23.6 million, which may be carried forward indefinitely.

Utilization of our NOLs, interest expense carryforwards, and research and development ("R&D") credit carryforwards may be subject to a substantial annual limitation due to ownership change limitations that have occurred previously or that could occur in the future in accordance with Section 382 of the Internal Revenue Code of 1986 ("Section 382") as well as similar state provisions. These ownership changes may limit the amount of NOLs and interest expense carryforwards that can be utilized annually to offset future taxable income and may limit the amounts of R&D credit carryforwards that can be utilized annually to offset taxes. In general, an ownership change as defined by Section 382 results from transactions increasing the ownership of certain shareholders or public groups in the stock of a corporation by more than 50% over a three-year period. Since our formation, we have raised capital through the issuance of capital stock on several occasions. These financings, combined with the purchasing shareholders' subsequent disposition of those shares, could result in a change of control, as defined by Section 382. We conducted an analysis under Section 382 to determine if historical changes in ownership through December 31, 2019, based upon publicly available information as of December 31, 2019, would limit or otherwise restrict our ability to utilize these NOLs, interest expense, and R&D credit carryforwards. As a result of this analysis, we do not believe there are any significant limitations on our ability to utilize these carryforwards. The NOLs and tax credits acquired from Lumara Health and Perosphere are subject to restrictions under Section 382. These restricted NOLs and credits may be utilized subject to an annual limitation. We identified ownership changes associated with the attributes acquired as part of the Lumara Health and Perosphere transactions and determined these attributes are subject to annual limitations. Future changes in ownership after December 31, 2019 could affect the limitation in future years and any limitation may result in expiration of a portion of the NOL or R&D credit carryforwards before utilization.

Unrecognized tax benefits represent uncertain tax positions for which reserves have been established. A reconciliation of our changes in unrecognized tax benefits is as follows (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Unrecognized tax benefits at the beginning of the year	$ 11,180	$ 10,560	$ 13,020
Additions based on tax positions related to the current year	521	12	574
Additions for tax positions from prior years	2,173	608	340
Subtractions for federal tax reform	—	—	(3,296)
Subtractions for tax positions from prior years	(336)	—	(78)
Unrecognized tax benefits at the end of the year	$ 13,538	$ 11,180	$ 10,560

The amount of unrecognized tax benefits that would impact the effective tax rate if recognized is immaterial, as the majority of our uncertain tax positions relate to NOL and credit carryforwards, which, if recognized, are currently expected to require a full valuation allowance.

Our unrecognized tax benefits as of December 31, 2019 increased by $2.4 million as compared to December 31, 2018 primarily due to tax reserves associated with NOLs and R&D credit carryforwards acquired in connection with the Perosphere transaction.

Our unrecognized tax benefits as of December 31, 2018 increased by $0.6 million as compared to December 31, 2017 primarily due to tax reserves established on R&D tax credits.

Our unrecognized tax benefits as of December 31, 2017 decreased by $2.5 million as compared to December 31, 2016 primarily due to the change in the federal tax rate, which reduced the future value of our federal NOLs and the corresponding value of the unrecognized tax benefits related to those NOLs. This decrease was partially offset by tax reserves established on R&D tax credits.

We have recorded minimal interest or penalties on unrecognized tax benefits since inception. We recognize both accrued interest and penalties related to unrecognized tax benefits in income tax expense. We do not expect our unrecognized tax benefits to change significantly in the next 12 months.

The statute of limitations for assessment by the Internal Revenue Service (the "IRS") and most state tax authorities is closed for tax years prior to December 31, 2016, although carryforward attributes that were generated prior to tax year 2016 may still be adjusted upon examination by the IRS or state tax authorities if they either have been or will be used in a future period. We file income tax returns in the U.S. federal and various state jurisdictions. There are currently no federal or state audits in progress.

L. ACCUMULATED OTHER COMPREHENSIVE LOSS

The following table summarizes the changes in the accumulated balances of other comprehensive loss associated with unrealized (losses) gains on securities during 2019, 2018 and 2017 (in thousands):

	December 31,		
	2019	2018	2017
Beginning balance	$ (3,985)	$ (3,908)	$ (3,838)
Other comprehensive income (loss) before reclassifications	746	(77)	(70)
Ending balance	$ (3,239)	$ (3,985)	$ (3,908)

M. EQUITY-BASED COMPENSATION

We currently maintain three equity compensation plans, namely our 2019 Equity Incentive Plan (the "2019 Plan"), which was approved by our stockholders at our 2019 annual meeting and replaced our Fourth Amended and Restated 2007 Equity Incentive Plan, as amended (the "2007 Plan"), the Lumara Health Inc. Amended and Restated 2013 Incentive Compensation Plan (the "Lumara Health 2013 Plan") and our 2015 Employee Stock Purchase Plan ("2015 ESPP"). All outstanding stock options granted under each of our equity compensation plans other than our 2015 ESPP (discussed below) have an exercise price equal to the closing price of a share of our common stock on the grant date.

Our 2019 Plan succeeded our 2007 Plan, which has expired and under which no further grants may be made. The number of shares available for future grants under the 2019 Plan consists of the sum of (i) the number of shares that remained available for issuance under the 2007 Plan as of the date of adoption of the 2019 Plan and (ii) an additional 2,161,000 shares. All outstanding awards granted under the 2007 Plan will remain subject to the terms of the 2007 Plan. In addition, any shares subject to outstanding awards granted under the 2007 Plan that expire or terminate for any reason prior to exercise will be added to the total number of shares of our stock available for issuance under the 2019 Plan. The allotted number of shares available for issuance under the 2019 Plan was 3,519,304 as of December 31, 2019 and there were 2,828,030 shares remaining available for future issuance under the 2019 Plan. As of December 31, 2019, all outstanding options under both the 2019 Plan and 2007 Plan have a ten-year term.

In November 2014, we assumed the Lumara Health 2013 Plan in connection with the acquisition of Lumara Health. The total number of shares issuable pursuant to awards under this plan as of the effective date of the acquisition and after taking into account any adjustments as a result of the acquisition, was 200,000 shares. As of December 31, 2019, there were 9,817 shares remaining available for issuance under the Lumara Health 2013 Plan, which are available for grants to certain employees, officers, directors, consultants, and advisers of AMAG and our subsidiaries who are newly-hired or who previously performed services for Lumara Health. All outstanding options under the Lumara Health 2013 Plan have a ten-year term.

The 2019 Plan, 2007 Plan and the Lumara Health 2013 Plan provide for the grant of stock options, RSUs, restricted stock, stock, stock appreciation rights and other equity interests in our company. We generally issue common stock from previously authorized but unissued shares to satisfy option exercises and RSU awards. The terms and conditions of each award are determined by our Board of Directors (the "Board") or the Compensation Committee of our Board. The terms and conditions of each award assumed in the acquisition of Lumara Health were previously determined by Lumara Health prior to being assumed in connection with the acquisition, subject to applicable adjustments made in connection with such acquisition.

In May 2015, our stockholders approved our 2015 ESPP, which authorizes the issuance of up to 200,000 shares of our common stock to eligible employees. In June 2018, at our annual meeting of stockholders, our stockholders approved an amendment to our 2015 ESPP to increase the maximum number of shares of our common stock that will be made available for sale thereunder by 500,000 shares. The terms of the 2015 ESPP permit eligible employees to purchase shares (subject to certain plan and tax limitations) in semi-annual offerings through payroll deductions of up to an annual maximum of 10% of the employee's "compensation" as defined in the 2015 ESPP. Shares are purchased at a price equal to 85% of the fair market value of our common stock on either the first or last business day of the offering period, whichever is lower. Plan periods consist of six-month periods typically commencing June 1 and ending November 30 and commencing December 1 and ending May 31. As of December 31, 2019, 445,713 shares have been issued under our 2015 ESPP.

During 2019, we also granted equity through inducement grants outside of our equity compensation plans to certain employees to induce them to accept employment with us (collectively, "Inducement Grants"). The options were granted at an exercise price equal to the fair market value of a share of our common stock on the respective grant dates and will be exercisable in four equal annual installments beginning on the first anniversary of the respective grant dates. The RSU grants will vest in three equal annual installments beginning on the first anniversary of the respective grant dates. The foregoing grants were made pursuant to inducement grants outside of our stockholder approved equity plans as permitted under the NASDAQ Stock Market listing rules. We assessed the terms of these awards and determined there was no possibility that we would have to settle these awards in cash and therefore, equity accounting was applied.

Stock Options

The following table summarizes stock option activity during 2019:

	2019 Equity Plan	2007 Equity Plan	2013 Lumara Equity Plan	Inducement Grants	Total
Outstanding at December 31, 2018	—	2,781,786	124,450	810,343	3,716,579
Granted	479,212	465,009	37,000	80,366	1,061,587
Exercised	—	(2,025)	—	—	(2,025)
Expired or terminated	(6,800)	(659,304)	(29,675)	(194,545)	(890,324)
Outstanding at December 31, 2019	472,412	2,585,466	131,775	696,164	3,885,817

Restricted Stock Units

The following table summarizes RSU activity during 2019:

	2019 Equity Plan	2007 Equity Plan	2013 Lumara Equity Plan	Inducement Grants	Total
Outstanding at December 31, 2018	—	1,041,141	2,101	85,293	1,128,535
Granted	132,542	1,023,847	1,100	29,385	1,186,874
Vested	—	(358,362)	(1,034)	(44,909)	(404,305)
Expired or terminated	(3,800)	(299,321)	—	(28,546)	(331,667)
Outstanding at December 31, 2019	128,742	1,407,305	2,167	41,223	1,579,437

In February 2019, March 2018 and February 2017, we granted RSUs under our 2007 Plan to certain members of our senior management covering a maximum of 365,591, 206,250 and 191,250 shares of common stock, respectively. These performance-based RSUs will vest, if at all, on February 24, 2022, March 1, 2021 and February 22, 2020, respectively, based on our total shareholder return ("TSR") performance measured against the median TSR of a defined group of companies over a three-year period. As of December 31, 2019, the maximum shares of common stock that may be issued under these awards was 325,091, 155,250 and 131,250, respectively. The maximum aggregate total fair value of these RSUs at December 31, 2019 was $4.2 million, $2.9 million and $2.6 million, respectively, which is being recognized as expense over a period of three years from the date of grant, net of any estimated and actual forfeitures.

Equity-based compensation expense

Equity-based compensation expense for 2019, 2018 and 2017 consisted of the following (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Cost of product sales	$ 871	$ 802	$ 884
Research and development	2,844	2,533	3,225
Selling, general and administrative	14,818	16,614	16,187
Total equity-based compensation expense	18,533	19,949	20,296
Income tax effect	—	—	(6,188)
After-tax effect of equity-based compensation expense	$ 18,533	$ 19,949	$ 14,108

In addition to the equity-based compensation expense presented in the table above, we incurred $0.7 million of equity-based compensation expense related to the restructuring activities during the first quarter of 2019, which is classified within restructuring expense on our consolidated statements of operations for the year ended December 31, 2019.

The following table summarizes the weighted average assumptions we utilized for purposes of valuing grants of options to our employees and non-employee directors:

	Years Ended December 31,					
	2019		2018		2017	
	Employees	Non-Employee Directors	Employees	Non-Employee Directors	Employees	Non-Employee Directors
Risk free interest rate (%)	2.12	2.04	2.75	2.70	1.86	1.61
Expected volatility (%)	57	59	57	59	53	57
Expected option term (years)	5.0	4.0	5.0	4.0	5.0	4.0
Dividend yield	none	none	none	none	none	none

Risk free interest rates utilized are based upon published U.S. Treasury yields at the date of the grant for the expected option term. During 2019, 2018 and 2017, we estimated our expected stock price volatility by using the historical volatility of our own common stock price over the prior period equivalent to our expected option term, in order to better reflect expected future volatility. To compute the expected option term, we analyze historical exercise experience as well as expected stock option exercise patterns.

The following table summarizes details regarding stock options granted under our equity incentive plans for the year ended December 31, 2019:

	December 31, 2019			
	Options	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term	Aggregate Intrinsic Value ($ in thousands)
Outstanding at beginning of year	3,716,579	$ 24.81	7.3	$ —
Granted	1,061,587	12.71	—	—
Exercised	(2,025)	14.56	—	—
Expired and/or forfeited	(890,324)	22.93	—	—
Outstanding at end of year	3,885,817	$ 21.94	6.8	$ 776
Outstanding at end of year - vested and unvested expected to vest	3,799,575	$ 22.12	6.8	$ 701
Exercisable at end of year	2,242,727	$ 25.76	5.5	$ 116

The weighted average grant date fair value of stock options granted during 2019, 2018 and 2017 was $6.33, $10.76 and $9.52, respectively. A total of 728,758 stock options vested during 2019. The aggregate intrinsic value of options exercised during 2019, 2018 and 2017, excluding purchases made pursuant to our 2015 ESPP, measured as of the exercise date, was approximately $0.0 million, $0.6 million and $0.4 million, respectively. The intrinsic value of a stock option is the amount by which the fair market value of the underlying stock on a specific date exceeds the exercise price of the common stock option.

The following table summarizes details regarding RSUs granted under our equity incentive plans for the year ended December 31, 2019:

	December 31, 2019	
	Restricted Stock Units	Weighted Average Grant Date Fair Value
Outstanding at beginning of year	1,128,535	$ 23.42
Granted	1,186,874	15.65
Vested	(404,305)	22.49
Forfeited	(331,667)	19.71
Outstanding at end of year	1,579,437	$ 18.60
Outstanding at end of year and expected to vest	1,462,952	$ 18.88

The weighted average grant date fair value of RSUs granted during 2019, 2018 and 2017 was $15.65, $22.32 and $24.18, respectively. The total fair value of RSUs that vested during 2019, 2018 and 2017 was $9.1 million, $12.4 million and $12.3 million, respectively.

At December 31, 2019, the amount of unrecorded equity-based compensation expense for both option and RSU awards, attributable to future periods was approximately $28.1 million. Of this amount, $11.5 million was associated with stock options and is expected to be amortized on a straight-line basis to expense over a weighted average period of approximately 2.5 years, $12.3 million was associated with RSUs and is expected to be amortized on a straight-line basis to expense over a weighted average period of approximately 1.7 years, and $4.3 million was associated with performance-based RSUs and is expected to be amortized on a straight-line basis to expense over a weighted average period of approximately 1.5 years. Such amounts will be amortized primarily to research and development or selling, general and administrative expense. These future estimates are subject to change based upon a variety of future events, which include, but are not limited to, changes in estimated forfeiture rates, employee turnover, and the issuance of new stock options and other equity-based awards.

N. EMPLOYEE SAVINGS PLAN

We provide a 401(k) Plan to our employees by which they may defer compensation for income tax purposes under Section 401(k) of the Internal Revenue Code. Each employee may elect to defer a percentage of his or her salary up to a specified maximum. As of December 31, 2019 our 401(k) Plan provided, among other things, for a company contribution of 4% of each employee's combined salary and certain other compensation for the plan year. Contributions by us to the 401(k) Plan are not taxable to employees until withdrawn from the 401(k) Plan and contributions are deductible by us when made. The amount of our company contribution for the 401(k) Plan was $3.7 million, $4.0 million and $2.3 million for 2019, 2018 and 2017, respectively.

O. STOCKHOLDERS' EQUITY

As of January 1, 2019, we had $20.5 million available under our previously approved program to repurchase up to $60.0 million in shares of our common stock. In March 2019, our Board authorized additional repurchases of shares in an amount up to $20.0 million under this program. The repurchase program does not have an expiration date and may be suspended for periods or discontinued at any time. Under the program, we may purchase our stock from time to time at the discretion of management in the open market or in privately negotiated transactions. The number of shares repurchased and the timing of the purchases will depend on a number of factors, including share price, trading volume and general market conditions, along with working capital requirements, general business conditions and other factors. We may also from time to time establish a trading plan under Rule 10b5-1 of the Securities and Exchange Act of 1934 to facilitate purchases of our shares under this program. During 2019, we repurchased and retired 1,074,800 shares of common stock under this repurchase program for $13.7 million. During 2018, we did not repurchase shares of common stock under this program. As of December 31, 2019, $26.8 million remains available for the repurchase of shares under the program.

P. COMMITMENTS AND CONTINGENCIES

Commitments

Our long-term contractual obligations include commitments and estimated purchase obligations entered into in the normal course of business. These include commitments related to our facility and vehicle leases, purchases of inventory, debt obligations, and other purchase obligations.

Operating Lease Obligations

During 2019, we had operating leases for real estate, including our lease for use as our principal executive offices, vehicles and office equipment. As of January 1, 2019, we recorded operating lease liabilities of $8.5 million and related ROU assets of $7.6 million in connection with our adoption of ASC 842. During the fourth quarter of 2019, we modified the operating lease for our principal executive offices to extend the term through July 2028. As of December 31, 2019, we had operating lease liabilities of $23.9 million and related ROU assets of $23.3 million. As of December 31, 2019, our leases have remaining terms of one to 8.5 years. The weighted average remaining lease term and discount rate for our operating leases was 7.95 years and 5.1% at December 31, 2019, respectively.

Lease costs for our operating leases were $5.1 million, $5.1 million and $3.0 million for the years ended December 31, 2019, 2018 and 2017, respectively. Operating cash outflows for operating leases were $5.2 million for the year ended December 31, 2019.

Future minimum payments under our non-cancelable operating leases as of December 31, 2019 are as follows (in thousands):

Period	Future Minimum Lease Payments
Year Ending December 31, 2020	$ 4,077
Year Ending December 31, 2021	3,207
Year Ending December 31, 2022	3,734
Year Ending December 31, 2023	3,230
Year Ending December 31, 2024	3,246
Thereafter	12,192
Total	$ 29,686
Less: Interest	$ 5,818
Operating lease liability	$ 23,868

Purchase Obligations

Purchase obligations primarily represent minimum purchase commitments for inventory. As of December 31, 2019, our minimum purchase commitments totaled $105.9 million.

Contingent Regulatory and Commercial Milestone Payments

We are required to make payments contingent on the achievement of certain regulatory and/or commercial milestones under the terms of our collaboration, license and other strategic agreements. Please refer to Note Q, "*Collaboration, License and Other Strategic Agreements*" for additional details regarding these contingent payments.

Employment Arrangements

We have entered into employment agreements or other arrangements with most of our executive officers and certain other employees, which provide for the continuation of salary and certain benefits and, in certain instances, the acceleration of the vesting of certain equity awards to such individuals in the event that the individual is terminated other than for cause, as defined in the applicable employment agreements or arrangements.

Indemnification Obligations

As permitted under Delaware law, pursuant to our certificate of incorporation, by-laws and agreements with all of our current directors, executive officers, and certain of our employees, we are obligated to indemnify such individuals for certain events or occurrences while the officer, director or employee is, or was, serving at our request in such capacity. The maximum potential amount of future payments we could be required to make under these indemnification obligations is not capped. Our director and officer insurance policy limits our initial exposure and our policy provides significant coverage. As a result, we believe the estimated fair value of these indemnification obligations is likely to be immaterial.

We are also a party to a number of other agreements entered into in the ordinary course of business, typically with business partners, contract manufacturers, clinical sites and customers, which contain typical provisions and which obligate us to indemnify the other parties to such agreements upon the occurrence of certain events. Such indemnification obligations are usually in effect from the date of execution of the applicable agreement for a period equal to the applicable statute of limitations. Our aggregate maximum potential future liability under such indemnification provisions is uncertain. We have not incurred any expenses as a result of such indemnification provisions during the years ended December 31, 2019, 2018 or 2017. Accordingly, we have determined that the estimated aggregate fair value of our potential liabilities under such indemnification provisions is not significant, and we have not recorded any liability related to such indemnification.

Contingencies

Legal Proceedings

We accrue a liability for legal contingencies when we believe that it is both probable that a liability has been incurred and that we can reasonably estimate the amount of the loss. We review these accruals and adjust them to reflect ongoing negotiations, settlements, rulings, advice of legal counsel and other relevant information. To the extent new information is obtained and our views on the probable outcomes of claims, suits, assessments, investigations or legal proceedings change, changes in our accrued liabilities would be recorded in the period in which such determination is made. For certain matters referenced below, the liability is not probable or the amount cannot be reasonably estimated and, therefore, accruals have not been made. In addition, in accordance with the relevant authoritative guidance, for any matters in which the likelihood of material loss is at least reasonably possible, we will provide disclosure of the possible loss or range of loss. If a reasonable estimate cannot be made, however, we will provide disclosure to that effect. We expense legal costs as they are incurred.

On November 6, 2019, we were served with a summons in a case filed in the U.S. District Court, Northern District of Ohio, captioned Civil Case in Saginaw Chippewa Indian Tribe v. Purdue Pharma et al (Case No. 1-19-op-45841). The complaint names K-V Pharmaceutical Company (“KV”) (Lumara Health’s predecessor company), certain of its successor entities, subsidiaries and affiliate entities as defendants, along with over forty other pharmaceutical companies. We acquired Lumara Health in November 2014, a year after KV emerged from bankruptcy protection, at which time it and its then-existing subsidiaries became our wholly-owned subsidiaries. The plaintiff in this action alleges that KV’s subsidiary, Ethex Corporation (as well as the other pharmaceutical companies named in the complaint), manufactured, promoted, sold, and distributed opioids, including a generic version of morphine. We are in discussions with the plaintiff’s counsel to dismiss all claims in the Chippewa case. At this time, based on available information, we are currently unable to predict the outcome or reasonably estimate the range of potential loss associated with this matter, if any.

On November 1, 2019, we were named as a defendant in a class action lawsuit filed in the United States District Court for the Western District of Missouri, captioned Barnes v. AMAG Pharmaceuticals, Inc., Case No. 3:19-cv-05088-RK (W.D. Mo.). Subsequently, other plaintiffs represented by the same law firm have filed four similar class action lawsuits in other jurisdictions, captioned Gill v. AMAG Pharmaceuticals, Inc., Case No. 2:19-cv-02681-DDC-JPO (D. Kan., filed Nov. 4, 2019), Faughnan, et al. v. AMAG Pharmaceuticals, Inc., Case No. 3:19-cv-01394-FJS-ML (N.D.N.Y, filed Nov. 12, 2019), Zamifrova v. AMAG Pharmaceuticals, Inc., Case No. 2:20-cv-00152-JMV-SCM (D.N.J., filed Jan. 3, 2020) and Nelson v. AMAG Pharmaceuticals, Inc., Case No. 2:20-cv-00089-WBS-DMC (E.D. Cal., filed Jan. 13, 2020). The plaintiffs in these actions, on behalf of themselves and purported state-wide classes of similarly situated consumers, assert claims for violation of state consumer protection laws and unjust enrichment based on allegations that we and/or our predecessor companies made misrepresentations and omissions regarding the effectiveness of Makena in connection with the sale and marketing of that product from 2011 through the present. Because these cases are in the earliest stages, we are currently unable to predict the outcome or reasonably estimate the range of potential loss associated with this matter, if any.

On August 29, 2019, Lunar Representative, LLC (“Plaintiff”), on behalf of the former equityholders of Lumara Health Inc. (“Lumara”), filed a complaint against us in the Delaware Court of Chancery, captioned Lunar Representative, LLC v. AMAG Pharmaceuticals, Inc. (No. 2019-0688-JTL). On September 25, 2019, we filed a motion to dismiss the complaint. On January 9,

2020, Plaintiff filed an amended complaint. Plaintiff alleges that we did not exercise commercially reasonable efforts to market and sell the drug product Makena, and failed to achieve sales milestones for Makena, in breach of certain provisions of the September 28, 2014 Agreement and Plan of Merger between, among other parties, us and Lumara. On January 24, 2020, we filed a motion to dismiss the amended complaint. Plaintiff is seeking damages of $50.0 million, together with pre- and post-judgment interest, as well as attorneys' fees and costs. At this time, based on available information, we are unable to reasonably assess the ultimate outcome of this case or determine an estimate, or a range of estimates, of potential losses. We believe this lawsuit is without merit and intend to vigorously defend against the allegations.

On or about April 6, 2016, we received Notice of a Lawsuit and Request to Waive Service of a Summons in a case entitled Plumbers' Local Union No. 690 Health Plan v. Actavis Group et. al. ("Plumbers' Union"), which was filed in the Court of Common Pleas of Philadelphia County, First Judicial District of Pennsylvania and, after removal to federal court, is now pending in the United States District Court for the Eastern District of Pennsylvania (Civ. Action No. 16-65-AB). Thereafter, we were also made aware of a related complaint entitled Delaware Valley Health Care Coalition v. Actavis Group et. al. ("Delaware Valley"), which was filed with the Court of Common Pleas of Philadelphia County, First Judicial District of Pennsylvania District Court of Pennsylvania (Case ID: 160200806). The complaints name K-V Pharmaceutical Company ("KV") (Lumara Health's predecessor company), certain of its successor entities, subsidiaries and affiliate entities (the "Subsidiaries"), along with a number of other pharmaceutical companies. We acquired Lumara Health in November 2014, a year after KV emerged from bankruptcy protection, at which time it, along with its then existing subsidiaries, became our wholly-owned subsidiary. We have not been served with process or waived service of summons in either case. The actions are being brought alleging unfair and deceptive trade practices with regard to certain pricing practices that allegedly resulted in certain payers overpaying for certain of KV's generic products. On July 21, 2016, the Plaintiff in the Plumbers' Union case dismissed KV with prejudice to refiling and on October 6, 2016, all claims against the Subsidiaries were dismissed without prejudice. We are in discussions with Plaintiff's counsel to similarly dismiss all claims in the Delaware Valley case. Because we have not been served with process in the Delaware Valley case, we are currently unable to predict the outcome or reasonably estimate the range of potential loss associated with this matter, if any.

On July 20, 2015, the Federal Trade Commission (the "FTC") notified us that it is conducting an investigation into whether Lumara Health or its predecessor engaged in unfair methods of competition with respect to Makena or any hydroxyprogesterone caproate product. The FTC noted in its letter that the existence of the investigation does not indicate that the FTC has concluded that Lumara Health or its predecessor has violated the law and we believe that our contracts and practices comply with relevant law and policy, including the federal Drug Quality and Security Act (the "DQSA"), which was enacted in November 2013, and public statements from and enforcement actions by the FDA regarding its implementation of the DQSA.
We have provided the FTC with a response providing a brief overview of the DQSA for context, which we believe was helpful, including: (a) how the statute outlined that large-scale compounding of products that are copies or near-copies of FDA-approved drugs (like Makena) is not in the interests of public safety; (b) our belief that the DQSA has had a significant impact on the compounding of hydroxyprogesterone caproate; and (c) how our contracts with former compounders allow those compounders to continue to serve physicians and patients with respect to supplying medically necessary alternative/altered forms of hydroxyprogesterone caproate. We believe we have fully cooperated with the FTC and we have had no further interactions with the FTC on this matter since we provided our response to the FTC in August 2015.

We may periodically become subject to other legal proceedings and claims arising in connection with ongoing business activities, including claims or disputes related to patents that have been issued or that are pending in the field of research on which we are focused. Other than the above actions, we are not aware of any material claims against us as of December 31, 2019 or 2018.

Q. COLLABORATION, LICENSE AND OTHER STRATEGIC AGREEMENTS

During 2019, we were a party to the following collaboration, license or other strategic agreements:

Perosphere

On January 16, 2019, we acquired Perosphere Pharmaceuticals Inc. ("Perosphere") pursuant to the Agreement and Plan of Merger (the "Perosphere Agreement"), dated as of December 12, 2018 between AMAG and Perosphere. Pursuant to the Perosphere Agreement, in January 2019, we paid approximately $50.0 million (the "Upfront Merger Consideration"). Of the Upfront Merger Consideration, approximately $40.0 million was funded from our available cash and approximately $10.0 million was deemed paid in connection with the cancellation of a convertible note in the principal amount of $10.0 million issued to us by Perosphere in October 2018. In addition to the Upfront Merger Consideration, we used available cash to repay $12.0 million of Perosphere's term loan indebtedness and approximately $6.2 million of Perosphere's other liabilities. We are also required to pay regulatory and sales milestone payments to Perosphere as described in more detail below. Further, we were

a party to a clinical trial collaboration agreement with a pharmaceutical company, which we acquired through the Perosphere transaction, which provided for partial funding of the Phase 3 program for ciraparantag if certain clinical milestones were met. In December 2019, the clinical trial collaboration agreement with the pharmaceutical company was terminated as described in more detail in Note D, "*Revenue Recognition*."

Substantially all of the fair value of the assets acquired in conjunction with the Perosphere transaction was concentrated in the IPR&D asset. As a result, we accounted for this transaction as an asset acquisition under ASU No. 2017-01, *Business Combinations (Topic 805): Clarifying the Definition of a Business* ("ASU 2017-01"). The acquired IPR&D was charged to expense at acquisition, as it relates to a development stage compound with no alternative future use. A summary of the assets and liabilities acquired in exchange for cash consideration of $60.8 million and $10.0 million that was deemed paid in connection with the cancellation of the convertible note, described above, is presented in the following table (in millions):

Assets:		
Cash	$	2.6
Operating lease right-of-use asset		0.8
Property and equipment		1.4
IPR&D		74.9
	$	79.7
Liabilities:		
Accrued severance liabilities	$	(1.7)
Deferred revenue		(6.4)
Operating lease liability		(0.8)
	$	(8.9)

Excluded from the table above are contingent payments associated with achievement of potential regulatory and sales milestones as described below, which were not deemed probable at the date of acquisition. The fair values of certain of the assets and liabilities acquired are classified as Level 3 estimates under the fair value hierarchy as they have been valued using unobservable inputs. These inputs include: (a) the estimated amount and timing of projected cash flows; (b) the probability of the achievement of key development and regulatory objectives; and (c) the risk-adjusted discount rate used to present value the probability-weighted cash flows. The fair values of the assets and liabilities acquired were initially valued and recorded based on various market factors, including an analysis of estimated sales using a discount rate of approximately 34%.

Under and subject to the terms and conditions set forth in the Perosphere Agreement, we are obligated to pay future contingent consideration of up to an aggregate of $365.0 million (the "Milestone Payments"), including (a) up to an aggregate of $140.0 million that becomes payable upon the achievement of specified regulatory milestones for ciraparantag (the "Regulatory Milestone Payments"), including a $40.0 million milestone payment upon approval of ciraparantag by the European Medicines Agency and (b) up to an aggregate of $225.0 million that becomes payable conditioned upon the achievement of specified sales milestones (the "Sales Milestone Payments"). If the final label approved for ciraparantag in the U.S. includes a boxed warning, the Regulatory Milestone Payments shall no longer be payable, and any previously paid Regulatory Milestone Payments shall be credited against 50% of any future Milestone Payments that otherwise becomes payable. The first sales milestone payment of $20.0 million will be payable upon annual net sales of ciraparantag of at least $100.0 million.

Velo

In September 2018, we exercised our option to acquire the global rights to AMAG-423 pursuant to an option agreement entered into in July 2015 with Velo Bio, LLC ("Velo"), the terms of which were amended at the time of exercise. Under the terms of the agreement, we paid Velo an upfront option exercise fee of $12.5 million and are obligated to pay Velo a $30.0 million milestone payment upon FDA approval of AMAG-423. In addition, we are obligated to pay sales milestone payments to Velo of up to $240.0 million in the aggregate, triggered at various annual net sales thresholds between $300.0 million and $900.0 million and low-single digit royalties based on net sales. Further, we have assumed additional obligations under a previous agreement entered into by Velo with a third-party, including a $5.0 million milestone payment upon regulatory approval and $10.0 million following the first commercial sale of AMAG-423, payable in quarterly installments as a percentage of quarterly gross commercial sales until the obligation is met. We are also obligated to pay the third-party low-single digit royalties based on net sales. We accounted for this transaction as an asset acquisition under ASU 2017-01.

Prasco

In December 2017, we entered into a Distribution and Supply Agreement (the "Prasco Agreement") with Prasco, LLC ("Prasco"), under which Prasco was granted an exclusive, non-sublicensable, nontransferable license to purchase, distribute and sell a generic version of Makena in the U.S. (the "Makena authorized generic"). In July 2018, Prasco launched the Makena authorized generic of both the single-dose and multi-dose IM injections and in August 2019, we and Prasco terminated the Prasco Agreement based on our determination that it was not commercially viable to continue the relationship. Under the Prasco Agreement, we were responsible for the manufacture and supply of the Makena authorized generic to be sold to Prasco at a predetermined supply price. Prasco was also required to pay us a certain percentage of the net distributable profits from the sale of the Makena authorized generic. We accounted for revenue recognized under the Prasco Agreement in accordance with ASC 606. Pursuant to the terms of the Prasco Agreement, in certain circumstances we have reimbursed Prasco as a result of our failure to supply a certain percentage of product ordered by Prasco in a prespecified timeframe. During the year ended December 31, 2019, we incurred $3.5 million of failure to supply penalties, the majority of which were incurred in the first quarter of 2019.

Antares

We are party to a development and license agreement (the "Antares License Agreement") with Antares Pharma, Inc. ("Antares"), which grants us an exclusive, worldwide, royalty-bearing license, with the right to sublicense, to certain intellectual property rights, including know-how, patents and trademarks, to develop, use, sell, offer for sale and import and export the Makena auto-injector. Under the terms of the Antares License Agreement, as amended in March 2018, we are responsible for the clinical development and preparation, submission and maintenance of all regulatory applications in each country where we desire to market and sell the Makena auto-injector, including the U.S. We are required to pay royalties to Antares on net sales of the Makena auto-injector until the Antares License Agreement is terminated (the "Antares Royalty Term"). The royalty rates range from high single digit to low double digits and are tiered based on levels of net sales of the Makena auto-injector and decrease after the expiration of licensed patents or where there are generic equivalents to the Makena auto-injector being sold in a particular country. In addition, we are required to pay Antares sales milestone payments upon the achievement of certain annual net sales. The Antares License Agreement terminates at the end of the Antares Royalty Term, but is subject to early termination by us for convenience and by either party upon an uncured breach by or bankruptcy of the other party. In March 2018, the Antares License Agreement was amended to, among other things, transfer the agreement to AMAG from our subsidiary, amend certain confidentiality provisions, and to provide for co-termination with the Antares Manufacturing Agreement (described below).

We are also party to a Manufacturing Agreement with Antares (the "Antares Manufacturing Agreement") that sets forth the terms and conditions pursuant to which Antares agreed to sell to us on an exclusive basis, and we agreed to purchase, the fully packaged Makena auto-injector for commercial distribution. Antares remains responsible for the manufacture and supply of the device components and assembly of the Makena auto-injector. We are responsible for the supply of the drug to be used in the assembly of the finished auto-injector product. The Antares Manufacturing Agreement terminates at the expiration or earlier termination of the Antares License Agreement, but is subject to early termination by us for certain supply failure situations, and by either party upon an uncured breach by or bankruptcy of the other party or our permanent cessation of commercialization of the Makena auto-injector for efficacy or safety reasons.

Endoceutics

In February 2017, we entered into the Endoceutics License Agreement with Endoceutics, Inc. ("Endoceutics") to obtain an exclusive right to commercialize Intrarosa for the treatment of vulvar and vaginal atrophy ("VVA") and FSD in the United States. We have agreed to use commercially reasonable efforts to market, promote and otherwise commercialize Intrarosa for the treatment of VVA. The transactions contemplated by the Endoceutics License Agreement closed on April 3, 2017. We accounted for the Endoceutics License Agreement as an asset acquisition under ASU 2017-01.

Upon the closing of the Endoceutics License Agreement, we made an upfront payment of $50.0 million and issued 600,000 shares of unregistered common stock to Endoceutics, which had a value of $13.5 million, as measured on April 3, 2017, the date of closing. In addition, we paid Endoceutics $10.0 million in the third quarter of 2017 upon the delivery by Endoceutics of Intrarosa launch quantities and $10.0 million in 2018 following the first anniversary of the closing. In the second quarter of 2017, we recorded a total of $83.5 million of consideration, of which $77.7 million was allocated to the Intrarosa developed technology intangible asset and $5.8 million was recorded as IPR&D expense based on their relative fair values.

Under the terms of the Endoceutics License Agreement, we pay tiered royalties to Endoceutics equal to a percentage of net sales of Intrarosa in the U.S. ranging from mid-teens to mid twenty percent. Endoceutics is also eligible to receive certain sales

milestone payments up to an aggregate of $895.0 million, including a first sales milestone payment of $15.0 million, which would be triggered when Intrarosa annual net U.S. sales exceed $150.0 million.

In April 2017, we entered into an exclusive commercial supply agreement with Endoceutics pursuant to which Endoceutics, itself or through affiliates or contract manufacturers, agreed to manufacture and supply Intrarosa to us (the "Endoceutics Supply Agreement") and is our exclusive supplier of Intrarosa in the U.S., subject to certain rights for us to manufacture and supply Intrarosa in the event of a cessation notice or supply failure (as such terms are defined in the Endoceutics Supply Agreement). The Endoceutics Supply Agreement will generally remain in effect until the termination of the Endoceutics License Agreement.

The Endoceutics License Agreement expires on the date of expiration of all royalty obligations due thereunder unless earlier terminated in accordance with the Endoceutics License Agreement.

Palatin

In January 2017, we entered into a license agreement with Palatin Technologies, Inc. ("Palatin") under which we acquired (a) an exclusive license in all countries of North America (the "Palatin Territory"), with the right to grant sub-licenses, to research, develop and commercialize the Vyleesi Products, (b) a worldwide non-exclusive license, with the right to grant sub-licenses, to manufacture the Vyleesi Products, and (c) a non-exclusive license in all countries outside the Palatin Territory, with the right to grant sub-licenses, to research and develop (but not commercialize) the Vyleesi Products (the "Palatin License Agreement"). The transaction closed in February 2017 and was accounted for as an asset acquisition under ASU 2017-01.

Under the terms of the Palatin License Agreement, in February 2017 we paid Palatin $60.0 million as a one-time upfront payment and subject to agreed-upon deductions reimbursed Palatin approximately $25.0 million for reasonable, documented, out-of-pocket expenses incurred by Palatin in connection with the development and regulatory activities necessary to submit the Vyleesi New Drug Application ("NDA") in the U.S. The $60.0 million upfront payment made in February 2017 to Palatin was recorded as IPR&D expense as the product candidate had not received regulatory approval. In June 2018, our NDA submission to the FDA for Vyleesi was accepted, which triggered a $20.0 million milestone payment, which we paid in the second quarter of 2018 and recorded as an IPR&D expense in the first quarter of 2018 when acceptance was deemed probable. In June 2019, the FDA approval of Vyleesi triggered a $60.0 million milestone payment to Palatin, which we paid in July 2019 and recorded as a developed technology intangible asset in the second quarter of 2019.

In addition, the Palatin License Agreement requires us to make contingent payments of up to $300.0 million of aggregate sales milestone payments upon the achievement of certain annual net sales milestones over the course of the license. The first sales milestone payment of $25.0 million will be triggered when Vyleesi annual net sales exceed $250.0 million. We are also obligated to pay Palatin tiered royalties on annual net sales of the Vyleesi Products, on a product-by-product basis, in the Palatin Territory ranging from the high-single digits to the low double-digits. After the expiration of the applicable royalties for any Vyleesi Product in a given country, the license for such Vyleesi Product in such country would become a fully paid-up, royalty-free, perpetual and irrevocable license. The Palatin License Agreement expires on the date of expiration of all royalty obligations due thereunder, unless earlier terminated in accordance with the Palatin License Agreement.

Abeona

We acquired the U.S. commercial rights to MuGard, a prescription oral mucoadhesive, under a June 2013 license agreement with Abeona (the "MuGard Rights"). We ceased selling MuGard at the end of 2019.

R. DEBT

Our outstanding debt obligations as of December 31, 2019 and December 31, 2018 consisted of the following (in thousands):

	December 31,	
	2019	2018
2022 Convertible Notes	$ 277,034	$ 261,933
2019 Convertible Notes	—	21,276
Total long-term debt	277,034	283,209
Less: current maturities	—	21,276
Long-term debt, net of current maturities	$ 277,034	$ 261,933

Convertible Notes

The outstanding balances of our Convertible Notes as of December 31, 2019 consisted of the following (in thousands):

	2022 Convertible Notes
Liability component:	
Principal	$ 320,000
Less: debt discount and issuance costs, net	42,966
Net carrying amount	$ 277,034
Gross equity component	$ 72,576

In accordance with accounting guidance for debt with conversion and other options, we separately account for the liability and equity components of our Convertible Notes by allocating the proceeds between the liability component and the embedded conversion option (the "Equity Component") due to our ability to settle the Convertible Notes in cash, common stock or a combination of cash and common stock, at our option. The carrying amount of the liability component was calculated by measuring the fair value of a similar liability that does not have an associated convertible feature. The allocation was performed in a manner that reflected our non-convertible debt borrowing rate for similar debt. The Equity Component of the Convertible Notes was recognized as a debt discount and represents the difference between the proceeds from the issuance of the Convertible Notes and the fair value of the liability of the Convertible Notes on their respective dates of issuance. The excess of the principal amount of the liability component over its carrying amount (the "Debt Discount") is amortized to interest expense using the effective interest method over five years. The Equity Component is not remeasured as long as it continues to meet the conditions for equity classification.

2022 Convertible Notes

In the second quarter of 2017, we issued $320.0 million aggregate principal amount of convertible senior notes due in 2022 and received net proceeds of $310.4 million from the sale of the 2022 Convertible Notes, after deducting fees and expenses of $9.6 million. The approximately $9.6 million of debt issuance costs primarily consisted of underwriting, legal and other professional fees, and allocated these costs to the liability and equity components based on the allocation of the proceeds. Of the total $9.6 million of debt issuance costs, $2.2 million was allocated to the Equity Component and recorded as a reduction to additional paid-in capital and $7.4 million was allocated to the liability component and is now recorded as a reduction of the 2022 Convertible Notes in our consolidated balance sheet. The portion allocated to the liability component is amortized to interest expense using the effective interest method over five years.

The 2022 Convertible Notes are governed by the terms of an indenture between us, as issuer, and Wilmington Trust, National Association, as the trustee. The 2022 Convertible Notes are senior unsecured obligations and bear interest at a rate of 3.25% per year, payable semi-annually in arrears on June 1 and December 1 of each year, beginning on December 1, 2017. The 2022 Convertible Notes will mature on June 1, 2022, unless earlier repurchased or converted. Upon conversion of the 2022 Convertible Notes, such 2022 Convertible Notes will be convertible into, at our election, cash, shares of our common stock, or a combination thereof, at a conversion rate of 36.5464 shares of common stock per $1,000 principal amount of the 2022 Convertible Notes, which corresponds to an initial conversion price of approximately $27.36 per share of our common stock.

The conversion rate is subject to adjustment from time to time upon the occurrence of certain events, including, but not limited to, the issuance of stock dividends and payment of cash dividends. At any time prior to the close of business on the business day immediately preceding March 1, 2022, holders may convert their 2022 Convertible Notes at their option only under the following circumstances:

1) during any calendar quarter (and only during such calendar quarter) commencing after the calendar quarter ending September 30, 2017, if the last reported sale price of our common stock for at least 20 trading days (whether or not consecutive) during a period of 30 consecutive trading days ending on the last trading day of the immediately preceding calendar quarter is greater than or equal to 130% of the conversion price on each applicable trading day;

2) during the five business day period after any five consecutive trading day period (the "measurement period") in which the trading price per $1,000 principal amount of the 2022 Convertible Notes for each trading day of the measurement period was less than 98% of the product of the last reported sale price of our common stock and the conversion rate on each such trading day; or

3) upon the occurrence of specified corporate events.

On or after March 1, 2022, until the close of business on the business day immediately preceding the maturity date, holders may convert all or any portion of their 2022 Convertible Notes, in multiples of $1,000 principal amount, at the option of the holder regardless of the foregoing circumstances. The 2022 Convertible Notes were not convertible as of December 31, 2019.

We determined the expected life of the debt was equal to the five-year term on the 2022 Convertible Notes. The effective interest rate on the liability component was 9.49% for the period from the date of issuance through December 31, 2019. As of December 31, 2019, the "if-converted value" did not exceed the remaining principal amount of the 2022 Convertible Notes.

2019 Convertible Notes

In February 2014, we issued $200.0 million aggregate principal amount of 2019 Convertible Notes. We received net proceeds of $193.3 million from the sale of the 2019 Convertible Notes, after deducting fees and expenses of $6.7 million. We used $14.1 million of the net proceeds from the sale of the 2019 Convertible Notes to pay the cost of the convertible bond hedges, as described below (after such cost was partially offset by the proceeds to us from the sale of warrants in the warrant transactions described below). The 2019 Convertible Notes are senior unsecured obligations and bear interest at a rate of 2.5% per year, payable semi-annually in arrears on February 15 and August 15 of each year.

In 2017, we entered into two privately negotiated transactions with certain investors to repurchase approximately $178.5 million aggregate principal amount of the 2019 Convertible Notes for an aggregate repurchase price of approximately $192.7 million, including accrued interest. Pursuant to ASC Topic 470, *Debt* ("ASC 470"), we concluded that the 2017 repurchases of 2019 Convertible Notes should be accounted for as extinguishments and we recorded a net debt extinguishment loss of $0.1 million related to the difference between the consideration paid, the fair value of the liability component and carrying values at the repurchase date. The remaining $21.4 million of 2019 Convertible Notes matured on February 15, 2019 and were settled with cash.

Convertible Notes Interest Expense

The following table sets forth total interest expense recognized related to the 2022 Convertible Notes and 2019 Convertible Notes during 2019, 2018, and 2017 (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Contractual interest expense	$ 10,467	$ 10,935	$ 8,961
Amortization of debt issuance costs	1,412	1,403	1,275
Amortization of debt discount	13,830	13,414	11,071
Total interest expense	$ 25,709	$ 25,752	$ 21,307

Convertible Bond Hedge and Warrant Transactions

In February 2014 we entered into convertible bond hedge transactions and separate warrant transactions of our common stock underlying the aggregate principal amount of the 2019 Convertible Notes with certain financial institutions (the "call spread counterparties"). In connection with our 2017 repurchases of the 2019 Convertible Notes, as discussed above, we entered into agreements with the call spread counterparties to terminate a portion of the then existing convertible bond hedge transactions in an amount corresponding to the amount of such 2019 Convertible Notes repurchased and to terminate a portion of the then-existing warrant transactions. In February 2019, the 2019 Convertible Notes were settled with cash and the remaining bond hedge and warrant transactions expired.

2023 Senior Notes

In August 2015, in connection with the CBR acquisition, we completed a private placement of $500 million aggregate principal amount of 7.875% Senior Notes due 2023 (the "2023 Senior Notes"). The 2023 Senior Notes were issued pursuant to an Indenture, dated as of August 17, 2015 (the "Indenture"), by and among us, certain of our subsidiaries acting as guarantors of the 2023 Senior Notes and Wilmington Trust, National Association, as trustee. In October 2017, we repurchased $25.0 million of the 2023 Senior Notes in a privately negotiated transaction, resulting in a loss on extinguishment of debt of $1.1 million. In September 2018, we repurchased the remaining $475.0 million of the 2023 Senior Notes at a premium of $28.1 million using the proceeds from the CBR sale, which resulted in a loss on extinguishment of debt of $35.9 million, inclusive of the premium paid.

2015 Term Loan Facility

In August 2015, we entered into a credit agreement with a group of lenders, including Jefferies Finance LLC as administrative and collateral agent, that provided us with, among other things, a six-year $350.0 million term loan facility,

under which we borrowed the full amount (the "2015 Term Loan Facility"). In May 2017, we repaid the remaining outstanding borrowings and accrued interest of the 2015 Term Loan Facility and, in accordance with ASC 470, recognized a $9.7 million loss on debt extinguishment.

Future Payments

Future annual principal payments on our long-term debt as of December 31, 2019 include $320.0 million due during the year ended December 31, 2022.

S. RESTRUCTURING EXPENSES

In February 2019, we completed a restructuring to combine our women's health and maternal health sales forces into one integrated sales team. Approximately 110 employees were displaced through this workforce reduction. We recorded one-time restructuring charges of $7.4 million primarily related to severance and related benefits on our consolidated statement of operations for the year ended December 31, 2019. We expect the restructuring charges incurred to date under this program to be substantially paid in cash by the end of the first quarter of 2020.

The following table displays charges taken related to restructuring activities during the year ended December 31, 2019 and a rollforward of the changes to the accrued balances as of December 31, 2019 (in thousands):

	Workforce reduction	Contract termination	Other	Total
Balance accrued at December 31, 2018	$ —	$ —	$ —	$ —
2019 restructuring charges	7,034	229	157	7,420
Payments	(6,237)	(229)	(157)	(6,623)
Balance accrued at December 31, 2019	$ 797	$ —	$ —	$ 797

T. CONSOLIDATED QUARTERLY FINANCIAL DATA - UNAUDITED

The following tables provide unaudited consolidated quarterly financial data for 2019 and 2018, which have been revised to correct for immaterial errors in prior periods as detailed below and further described in Note X, *"Revision of Prior Period Financial Statements"* (in thousands, except per share data):

	March 31, 2019	June 30, 2019	September 30, 2019	December 31, 2019
Total revenues	$ 75,488	$ 77,767	$ 83,808	$ 89,483
Gross profit	57,011	53,477	62,703	46,162
Operating expenses [1]	175,024	169,662	81,050	240,329
Net loss from continuing operations	$ (122,400)	$ (121,169)	$ (23,940)	$ (200,152)
Net income (loss) from discontinued operations	$ —	$ —	$ —	$ —
Net loss	$ (122,400)	$ (121,169)	$ (23,940)	$ (200,152)
Basic and diluted earnings per share:				
Loss from continuing operations	$ (3.55)	$ (3.58)	$ (0.71)	$ (5.90)
Income (loss) from discontinued operations	—	—	—	—
Total	$ (3.55)	$ (3.58)	$ (0.71)	$ (5.90)

	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018
Total revenues	$ 116,867	$ 145,663	$ 121,646	$ 87,871
Gross profit	52,955	68,887	75,157	59,155
Operating expenses [2]	104,239	27,591	95,084	78,241
Net loss from continuing operations	$ (58,994)	$ (26,795)	$ (65,282)	$ (21,004)
Net income (loss) from discontinued operations	$ 3,856	$ 5,736	$ 95,517	$ (1,531)
Net (loss) income	$ (55,138)	$ (21,059)	$ 30,235	$ (22,535)
Basic and diluted earnings per share:				
Loss from continuing operations	$ (1.72)	$ (0.78)	$ (1.89)	$ (0.61)
Income (loss) from discontinued operations	0.11	0.17	2.77	(0.04)
Total	$ (1.61)	$ (0.61)	$ 0.88	$ (0.65)

The sum of quarterly earnings per share totals differ from annual earnings per share totals due to rounding.

[1] Operating expenses for the first quarter of 2019 include $74.9 million relating to IPR&D acquired through the Perosphere acquisition and $7.4 million relating to the restructuring expenses for the consolidation of the women's health and maternal health sales forces. Operating expenses for the second quarter of 2019 include $77.4 million of impairment charges relating to the Makena base technology intangible asset. Operating expenses for the fourth quarter of 2019 include $155.0 million of impairment charges relating to the Makena auto-injector, Intrarosa and Vyleesi asset groups.

[2] Operating expenses for the second quarter of 2018 include the reversal of $49.8 million relating to the fair value of a contingent consideration liability that was no longer expected to be paid.

The following tables present the effect of the revisions to our unaudited condensed consolidated statements of operations for the three months ended March 31, 2019, June 30, 2019, September 30, 2019 and December 31, 2019 to correct for immaterial errors in prior periods as further described in Note X, *"Revision of Prior Period Financial Statements"* (in thousands, except per share amounts):

	Three Months Ended March 31, 2019			Three Months Ended June 30, 2019		
	As reported	Adj	As adjusted	As reported	Adj	As adjusted
Product sales, net	$ 75,729	$ (316)	$ 75,413	$ 77,976	$ (342)	$ 77,634
Total revenues	75,804	(316)	75,488	78,109	(342)	77,767
Income tax (benefit) expense	(137)	—	(137)	(120)	—	(120)
Net loss	$ (122,084)	$ (316)	$ (122,400)	$ (120,827)	$ (342)	$ (121,169)
Basic and diluted net loss per share	$ (3.54)	$ (0.01)	$ (3.55)	$ (3.57)	$ (0.01)	$ (3.58)

	Three Months Ended September 30, 2019			Three Months Ended December 31, 2019		
	As reported	Adj	As adjusted	As reported	Adj	As adjusted
Product sales, net	$ 84,107	$ (323)	$ 83,784	$ 73,378	$ (224)	$ 73,154
Total revenues	84,131	(323)	83,808	89,707	(224)	89,483
Income tax (benefit) expense	232	—	232	(21)	—	(21)
Net loss	$ (23,617)	$ (323)	$ (23,940)	$ (199,928)	$ (224)	$ (200,152)
Basic and diluted net loss per share	$ (0.70)	$ (0.01)	$ (0.71)	$ (5.89)	$ (0.01)	$ (5.90)

The following tables present the effect of the revisions to our unaudited condensed consolidated statements of operations for the three months ended March 31, 2018, June 30, 2018, September 30, 2018 and December 31, 2018 to correct for immaterial errors in prior periods as further described in Note X, *"Revision of Prior Period Financial Statements"* (in thousands, except per share amounts):

	Three Months Ended March 31, 2018			Three Months Ended June 30, 2018		
	As reported	Adj	As adjusted	As reported	Adj	As adjusted
Product sales, net	$ 117,348	$ (520)	$ 116,828	$ 146,219	$ (591)	$ 145,628
Total revenues	117,387	(520)	116,867	146,254	(591)	145,663
Income tax (benefit) expense	(8,000)	376	(7,624)	52,556	387	52,943
Net loss	$ (54,242)	$ (896)	$ (55,138)	$ (20,081)	$ (978)	$ (21,059)
Basic and diluted net loss per share	$ (1.59)	$ (0.02)	$ (1.61)	$ (0.58)	$ (0.03)	$ (0.61)

	Three Months Ended September 30, 2018			Three Months Ended December 31, 2018		
	As reported	Adj	As adjusted	As reported	Adj	As adjusted
Product sales, net	$ 122,238	$ (592)	$ 121,646	$ 88,047	$ (251)	$ 87,796
Total revenues	122,238	(592)	121,646	88,122	(251)	87,871
Income tax (benefit) expense	(2,352)	12	(2,340)	(2,550)	7	(2,543)
Net loss	$ 30,839	$ (604)	$ 30,235	$ (22,277)	$ (258)	$ (22,535)
Basic and diluted net loss per share	$ 0.89	$ (0.01)	$ 0.88	$ (0.64)	$ (0.01)	$ (0.65)

U. VALUATION AND QUALIFYING ACCOUNTS (IN THOUSANDS)

	Balance at Beginning of Period	Additions [2]	Deductions Charged to Reserves	Balance at End of Period
Year ended December 31, 2019:				
Accounts receivable allowances[1]	$ 9,543	$ 324,542	$ (310,668)	$ 23,417
Rebates, fees and returns reserves[2]	$ 81,868	$ 321,210	$ (283,653)	$ 119,425
Valuation allowance for deferred tax assets [3]	$ 114,516	$ 104,858	$ (1,083)	$ 218,291
Year ended December 31, 2018:				
Accounts receivable allowances[1]	$ 12,060	$ 229,509	$ (232,026)	$ 9,543
Rebates, fees and returns reserves[2]	$ 103,846	$ 272,913	$ (294,891)	$ 81,868
Valuation allowance for deferred tax assets [3]	$ 4,740	$ 109,800	$ (24)	$ 114,516
Year ended December 31, 2017:				
Accounts receivable allowances[1]	$ 9,533	$ 168,945	$ (166,418)	$ 12,060
Rebates, fees and returns reserves[2]	$ 90,809	$ 257,273	$ (244,236)	$ 103,846
Valuation allowance for deferred tax assets [3]	$ 1,429	$ 3,875	$ (564)	$ 4,740

[1] Accounts receivable allowances represent discounts and other chargebacks related to the provision of our product sales.

[2] Additions to rebates, fees and returns reserves are recorded as a reduction of revenues.

[3] As of December 31, 2019 and 2018, we have established a valuation allowance on our net deferred tax assets other than refundable AMT credits. At December 31, 2017, our valuation allowance related primarily to certain of our state NOL and credit carryforwards.

V. RECENTLY ISSUED AND PROPOSED ACCOUNTING PRONOUNCEMENTS

From time to time, new accounting pronouncements are issued by the FASB or other standard setting bodies that are adopted by us as of the specified effective date.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* ("ASU 2016-13"). This standard requires entities to measure all expected credit losses for financial assets held at the reporting date based on historical experience, current conditions and reasonable and supportable forecasts. We adopted ASU 2016-13 effective January 1, 2020. The adoption of ASU 2016-13 did not have a material impact on our consolidated financial statements.

W. RECENTLY ADOPTED ACCOUNTING PRONOUNCEMENTS

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)* ("ASC 842"). This standard requires an entity to recognize on its balance sheet assets and liabilities associated with the rights and obligations created by leases with terms greater than twelve months. We adopted the standard effective January 1, 2019. We chose to apply the provisions of ASC 842 as of the effective date with no restatement of prior periods or cumulative adjustment to retained earnings. Upon adoption, we elected to utilize the package of transition practical expedients, which allowed us to carry forward prior conclusions related to whether any expired or existing contracts are or contain leases, the lease classification for any expired or existing leases and initial direct costs for existing leases. We also made accounting policy elections to not separate lease and non-lease components for our real estate lease and to not recognize leases with an initial term of twelve months or less within our condensed consolidated balance sheets and to recognize those lease payments on a straight-line basis on our condensed consolidated statements of income over the lease term.

In preparation for adoption of the standard, we implemented internal controls to enable the preparation of the related financial information. The adoption of this standard resulted in the recognition of operating lease liabilities of $8.5 million and related ROU assets of $7.6 million on our condensed consolidated balance sheets as of January 1, 2019, but did not have an impact on our consolidated statements of operations.

In November 2018, the FASB issued ASU No. 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction between Topic 808 and Topic 606* ("ASU 2018-18"). This standard clarifies that certain transactions between participants in a collaborative arrangement should be accounted for under ASC 606 when the counterparty is a customer. In

addition, ASU 2018-18 precludes an entity from presenting consideration from a transaction in a collaborative arrangement as revenue from contracts with customers if the counterparty is not a customer for that transaction. We adopted ASU 2018-18 during the first quarter of 2019 and applied the provisions of this update retrospectively to all contracts that were not completed as of the date of our initial adoption of ASC 606. The adoption of ASU 2018-18 did not have a material impact on our financial position or results of operations.

In March 2016, the FASB issued ASU No. 2016-09, Compensation - Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting ("ASU 2016-09"). The new standard involves several aspects of the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities and classification on the statement of cash flows. We adopted ASU 2016-09 during the first quarter of 2017 and will now record all excess tax benefits and deficiencies related to share-based compensation in our condensed consolidated statements of operations as discrete events in the interim reporting period in which the benefit or deficiency occurs. Such benefits and deficiencies will not be considered in the calculation of our annual estimated effective tax rate. Any excess tax benefits that were not previously recognized because the related tax deduction had not reduced current taxes payable (i.e. was not realized) are to be recorded using a modified retrospective transition method through a cumulative-effect adjustment to retained earnings as of the beginning of the period in which the new guidance is adopted. We recorded a cumulative-effect adjustment to our accumulated deficit from previously unrecognized excess tax benefits of $21.6 million during the first quarter of 2017. Lastly, we will continue to use the current method of estimated forfeitures each period rather than accounting for forfeitures as they occur.

X. REVISION OF PRIOR PERIOD FINANCIAL STATEMENTS

Subsequent to the issuance of our Form 10-K for the year ended December 31, 2019, management identified certain individually immaterial errors aggregating to $6.3 million related to governmental rebate accruals associated with Makena sales from 2016 through 2019.

From 2016 through 2019, we understated our GTN adjustments for governmental rebates and the related accrual for a certain state program. We concluded that the errors were not material to any prior annual or interim period; however, we determined that correcting the aggregate error would be material to the three and six months ended June 30, 2020. As a result, we have revised our historical financial statements to properly reflect GTN adjustments and the related accrual in the appropriate periods.

The effect of the corrections to our consolidated balance sheet for the years ended December 31, 2019 and 2018 were as follows (in thousands):

	December 31, 2019		
	As reported	Adjustment	As adjusted
Accrued expenses	177,079	6,303	183,382
Accumulated deficit	$ (1,008,898)	$ (6,303)	$ (1,015,201)

	December 31, 2018		
	As reported	Adjustment	As adjusted
Accrued expenses	129,537	5,098	134,635
Accumulated deficit	$ (542,442)	$ (5,098)	$ (547,540)

The effect of the corrections to our consolidated statements of operations for the years ended December 31, 2019, 2018 and 2017 are as follows (in thousands, except per share amounts):

	Year Ended December 31, 2019		
	As reported	Adjustment	As adjusted
Product sales, net	$ 311,190	$ (1,205)	$ 309,985
Total revenues	327,751	(1,205)	326,546
Income tax (benefit) expense	(47)	—	(47)
Net loss from continuing operations	(466,456)	(1,205)	(467,661)
Net loss	$ (466,456)	$ (1,205)	$ (467,661)
Basic and diluted net loss per share	$ (13.71)	$ (0.03)	$ (13.74)

	Year Ended December 31, 2018		
	As reported	Adjustment	As adjusted
Product sales, net	$ 473,852	$ (1,954)	$ 471,898
Total revenues	474,002	(1,954)	472,048
Income tax (benefit) expense	39,654	782	40,436
Net loss from continuing operations	(169,339)	(2,736)	(172,075)
Net loss	$ (65,761)	$ (2,736)	$ (68,497)
Basic and diluted net loss per share	$ (1.91)	$ (0.08)	$ (1.99)

	Year Ended December 31, 2017		
	As reported	Adjustment	As adjusted
Product sales, net	$ 495,645	$ (1,802)	$ 493,843
Total revenues	495,769	(1,802)	493,967
Income tax (benefit) expense	(175,254)	(267)	(175,521)
Net loss from continuing operations	(205,153)	(1,535)	(206,688)
Net loss	$ (199,228)	$ (1,535)	$ (200,763)
Basic and diluted net loss per share	$ (5.71)	$ (0.04)	$ (5.75)

The consolidated statements of other comprehensive loss for the years ended December 31, 2019, 2018 and 2017 have been revised to include the changes to “net loss” summarized above.

The consolidated statements of stockholders’ equity for the years ended December 31, 2019, 2018 and 2017 have been revised to include the changes to “net loss” summarized above as well as an increase of $0.8 million to the beginning “accumulated deficit” as of January 1, 2017, representing the accumulated error through that date.

The impact on our consolidated statements of cash flows for the years ended December 31, 2019, 2018 and 2017, was limited to the offsetting corrections between “net loss” and changes in “accounts payable and accrued expenses” and “deferred income taxes” presented within “net cash used in operating activities” in each year, as summarized in the above tables.

Y. SUBSEQUENT EVENTS *(unaudited)*

In connection with the amendment of our financial statements, we have evaluated subsequent events through the date the financial statements were available to be reissued.

May 2020 Restructuring

In May 2020, we completed a restructuring to reduce the size of our organization in conjunction with the planned divestiture of Intrarosa and Vyleesi and expected declines in our revenue due to the COVID-19 pandemic. Approximately 110 employees were displaced through this workforce reduction. We recorded a one-time restructuring charge of $8.2 million primarily related to severance and related benefits on our condensed consolidated statement of operations during the second quarter of 2020 and expect the restructuring charges incurred to date under this program to be substantially paid in cash by the end of the second quarter of 2021.

Sale of Intrarosa

On May 21, 2020, we sold our rights to commercialize and have manufactured Intrarosa in the United States to Millicent Pharma Limited (“Millicent”) pursuant to an Asset Purchase Agreement between the Company and Millicent, dated May 21, 2020. Under the terms of the Asset Purchase Agreement, we received an upfront payment of $20.9 million in cash, subject to customary purchase price adjustments, including in connection with the transfer of certain inventory. We are eligible to receive up to $105.0 million in aggregate milestone payments upon the achievement of certain sales milestones, namely: (a)

$25.0 million the first time net sales during any consecutive twelve month period exceeds $65.0 million, (b) $35.0 million the first time net sales during any consecutive twelve month period exceeds $115.0 million and (c) $45.0 million the first time net sales during any consecutive twelve month period exceeds $175.0 million. We recognized a Gain on Sale of Assets of $14.4 million on our condensed consolidated statements of operations for the three and six months ended June 30, 2020 related to this transaction.

Cessation of the AMAG-423 Study

In July 2020, we decided to stop the AMAG-423 Phase 2b/3a study. This decision was based primarily on the independent Data Safety Monitoring Board's (the "DSMB") unanimous recommendation to stop the study following an interim analysis of the data collected to date in the study, which analysis we asked the DSMB to conduct due to extended and ongoing delays in enrollment of the trial (based primarily on the effect of COVID-19 on clinical trial research and the nature of the patient population). There were no safety concerns raised during this study and safety was not a contributing factor to our decision to terminate the study. We are currently focused on ensuring an appropriate closeout of the study in partnership with investigators and other relevant stakeholders. In connection with the cessation of the AMAG-423 Phase 2b/3a study, on August 6, 2020, we terminated our supply agreement (including termination of significant minimum purchase obligations) with our third party supplier in exchange for a one-time payment by us of $12.5 million and our grant to our third party supplier of a 9-month option (subject to extension under certain situations) to acquire the AMAG-423 program rights and assume our related obligations, including our obligations under the Velo Option Agreement.

License to Develop and Commercialize ciraparantag in Europe, Australia and New Zealand

In July 2020, we entered into a License and Commercialization Agreement with Norgine B.V. ("Norgine", and such agreement, the "Norgine Agreement"), pursuant to which we granted Norgine an exclusive license to develop and commercialize ciraparantag in certain countries in Europe, Australia and New Zealand. We received a $30.0 million upfront payment upon signing. In addition, pursuant to the terms and conditions of the Norgine Agreement (a) Norgine will pay us one-

third of the actual and reasonable out-of-pocket costs of the Phase 3 program, pursuant to a mutually agreed upon budget, (b) we are eligible to receive up to $70.0 million upon the achievement of certain regulatory milestones (of which we will pay $40.0 million to the former equity holders of Perosphere pursuant to the terms of the Perosphere Agreement), (c) we are eligible to receive up to $190.0 million contingent upon meeting certain sales milestones, and (d) Norgine will pay us tiered double-digit royalties on net sales in the licensed territory. We will be responsible for manufacturing and supplying Norgine with its requirements of clinical and commercial product pursuant to supply agreement(s) to be entered into by the parties.

Settlement

On July 14, 2020, we entered into a Confidential Settlement Agreement and Release with a third-party manufacturer to resolve outstanding disputes. Pursuant to this agreement, we were paid a sum of $17.4 million, and the parties exchanged mutual releases to resolve all disputes between them.

Termination of the Palatin Agreement

In July 2020, we entered into a termination agreement with Palatin detailing the terms and conditions for the termination of our rights and obligations to develop and commercialize Vyleesi under the Palatin License Agreement and for the transfer of full ownership of Vyleesi to Palatin (the "Termination Agreement"). In accordance with the terms of the Termination Agreement, we transferred and assigned to Palatin the regulatory approval for Vyleesi, inventory, certain third party contracts, intellectual property rights and regulatory files and commercial materials of AMAG related to Vyleesi in the AMAG Territory. In consideration for the early termination of the License Agreement, the assumption of certain liabilities by Palatin (including significant minimum purchase obligations), and in lieu of any future milestone payments, royalties and other payments by AMAG to Palatin contemplated by the Palatin License Agreement, we paid Palatin $12.0 million following the termination, and we will pay an additional $4.3 million on March 31, 2021. In addition, we agreed to provide certain transitional services to Palatin for a period of time following the closing pursuant to a transition services agreement.

ITEM 9A. CONTROLS AND PROCEDURES:

Managements' Evaluation of our Disclosure Controls and Procedures

Our principal executive officer and principal financial officer, with the participation of our management, have each evaluated the effectiveness of our disclosure controls and procedures (as defined in Rule 13a-15(e) under the Exchange Act) as of December 31, 2019. At the time we filed the Original 10-K, our principal executive officer and principal financial officer had concluded that as of December 31, 2019 our disclosure controls and procedures were effective to provide reasonable assurance that information we are required to disclose in the reports that we file or submit under the Securities Exchange Act is recorded, processed, summarized and reported within the time periods specified in the Securities and Exchange Commission's rules and forms and that such information is accumulated and communicated to management, including our principal executive officer and principal financial officer, as appropriate to allow timely decisions regarding required disclosure. Subsequent to that evaluation, our principal executive officer and principal financial officer concluded that our disclosure controls and procedures were not effective as of December 31, 2019 because of the material weakness in our internal control over financial reporting, as described in Management's Annual Report on Internal Control Over Financial Reporting (Restated).

Management's Annual Report on Internal Control Over Financial Reporting (Restated)

Management's Annual Report on Internal Control Over Financial Reporting (Restated) is contained in Part II, Item 8 "Financial Statements and Supplementary Data" of this Amended Annual Report on Form 10-K/A for the year ended December 31, 2019 and is incorporated herein by reference.

Plan for Remediation of Material Weakness

We have already taken certain steps and will take additional steps to remediate this material weakness, including the development of enhanced controls governing our GTN adjustments for governmental rebates and accruals.

Our remediation efforts are intended to address the identified material weakness. Management is committed to continuous improvement of our internal control over financial reporting and will continue to diligently review our internal control over financial reporting.

Changes in Internal Control Over Financial Reporting

There were no changes in our internal control over financial reporting (as such term is defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) that occurred during the three months ended December 31, 2019 that have materially affected, or that are reasonably likely to materially affect, our internal control over financial reporting.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES:

(a) The following documents are filed as part of this Annual Report on Form 10-K/A:

(1) Financial Statements:
The financial statements are filed as part of this Annual Report on Form 10-K/A under “Item 8. Financial Statements and Supplementary Data.”

(2) Financial Statement Schedules:
The financial statement schedules are omitted as they are either not applicable or the information required is presented in the financial statements and notes thereto under "Item 8. Financial Statements and Supplementary Data."

(3) Exhibits:
See Exhibit Index immediately preceding the signature page of this Annual Report on Form 10-K/A.

EXHIBIT INDEX

Exhibit Number	Description
2.1	Agreement and Plan of Merger, dated as of September 28, 2014, by and among Lumara Health Inc., AMAG Pharmaceuticals, Inc., Snowbird, Inc., and Lunar Representative, LLC as the Stockholders' Representative (incorporated herein by reference to Exhibit 2.1 to the Company's Current Report on Form 8-K filed September 29, 2014, File No. 001-10865)
2.2	Agreement and Plan of Merger, dated as of December 12, 2018, by and among AMAG Pharmaceuticals, Inc., Magellan Merger Sub, Inc., Perosphere Pharmaceuticals Inc. and Bryan E. Laulicht, as Perosphere equityholder representative (incorporated by reference to Exhibit 2.1 to the Company's Current Report on Form 8-K filed December 13, 2018)
3.1, 4.1	Restated Certificate of Incorporation of AMAG Pharmaceuticals, Inc. (incorporated herein by reference to Exhibits 3.1 and 4.1to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2010, File No. 001-10865)
3.2, 4.2	Certificate of Amendment of Restated Certificate of Incorporation of AMAG Pharmaceuticals, Inc. as filed on May 21, 2015 with the Delaware Secretary of State (incorporated herein by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed May 28, 2015, File No. 001-10865)
3.3, 4.3	Amended and Restated By-Laws of AMAG Pharmaceuticals, Inc. (incorporated herein by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed December 17, 2015, File No. 001-10865)
4.4	Specimen certificate representing AMAG Pharmaceuticals, Inc.'s Common Stock (incorporated herein by reference to Exhibit 4.3 to the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2009, File No. 001-14732)
4.5	Indenture, dated as of May 10, 2017, by and between AMAG Pharmaceuticals, Inc. and Wilmington Trust, National Association (incorporated herein by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed May 15, 2017, File No. 001-10865)
4.6	First Supplemental Indenture, dated as of May 10, 2017, by and between AMAG Pharmaceuticals, Inc. and Wilmington Trust, National Association (incorporated herein by reference to Exhibit 4.2 to the Company's Current Report on Form 8-K filed May 15, 2017, File No. 001-10865)
4.7	Form of 3.25% Convertible Senior Note due 2022 (incorporated herein by reference to Exhibit 4.3 to the Company's Current Report on Form 8-K filed May 15, 2017, File No. 001-10865
4.8	Description of AMAG Pharmaceuticals, Inc. Securities Registered Pursuant to Section 12 of the Securities and Exchange Act of 1934 (incorporated herein by reference to Exhibit 4.8 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019, File No. 001-10865)
10.1*	Form of Indemnification Agreement (incorporated herein by reference to Exhibit 10.2 to the Company's Annual Report on Form 10-K for the year ended December 31, 2009, File No. 001-14732)
10.2*	AMAG Pharmaceuticals, Inc.'s Amended and Restated Non-Employee Director Compensation Policy (incorporated herein by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2019, File No. 001-10865)
10.3*	AMAG Pharmaceuticals, Inc. Non-Employee Directors' Deferred Compensation Program (incorporated herein by reference to Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2019, File No. 001-10865)
10.4*	AMAG Pharmaceuticals, Inc.'s 2019 Equity Incentive Plan (incorporated herein by reference to Appendix A to the Company's Definitive Proxy Statement on Schedule 14A filed April 15, 2019, File No. 001-10865)
10.5*	AMAG Pharmaceuticals, Inc.'s Fourth Amended and Restated 2007 Equity Incentive Plan (incorporated herein by reference to Appendix A to the Company's Definitive Proxy Statement on Schedule 14A filed April 25, 2018, File No. 001-10865)
10.6*	AMAG Pharmaceuticals, Inc. 2015 Employee Stock Purchase Plan (incorporated herein by reference to Appendix C to the Company's Definitive Proxy Statement on Schedule 14A filed April 16, 2015, File No. 001-10865)

10.7*	AMAG Pharmaceuticals, Inc. First Amendment to 2015 Employee Stock Purchase Plan (incorporated herein by reference to Appendix B to the Registrant's Definitive Proxy Statement on Schedule 14A filed April 25, 2018, File No. 001-10865)
10.8*	Lumara Health Inc. Amended and Restated 2013 Incentive Compensation Plan (incorporated herein by reference to Exhibit 10.6 to the Company's Annual Report on Form 10-K for the year ended December 31, 2014, File No. 001-10865)
10.9*	Form of Non-Plan Stock Option Agreement, by and between AMAG Pharmaceuticals, Inc. and William K. Heiden (incorporated herein by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K filed May 10, 2012, File No. 001-10865)
10.10*	Form of Incentive Stock Option Agreement for AMAG Pharmaceuticals, Inc. Employees under AMAG Pharmaceuticals, Inc.'s 2019 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.10 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019, File No. 001-10865)
10.11*	Form of Non-Qualified Stock Option Agreement for AMAG Pharmaceuticals, Inc. Employees under AMAG Pharmaceuticals, Inc.'s 2019 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.11 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019, File No. 001-10865)
10.12*	Form of Restricted Stock Unit Agreement for AMAG Pharmaceuticals, Inc. Employees under AMAG Pharmaceuticals, Inc.'s 2019 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.12 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019, File No. 001-10865)
10.13*	Form of Non-Qualified Stock Option Agreement for Non-Employee Directors under AMAG Pharmaceuticals, Inc.'s 2019 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.13 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019, File No. 001-10865)
10.14*	Form of Restricted Stock Unit Agreement for Non-Employee Directors under AMAG Pharmaceuticals, Inc.'s 2019 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.14 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019, File No. 001-10865)
10.15*	Form of Restricted Stock Unit Agreement (Deferred) for Non-Employee Directors under AMAG Pharmaceuticals, Inc.'s 2019 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.15 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019, File No. 001-10865)
10.16*	Form of Non-Qualified Stock Option Agreement - Non-Plan Inducement Grant (incorporated herein by reference to Exhibit 10.12 to the Company's Annual Report on Form 10-K for the year ended December 31, 2017, File No. 001-10865)
10.17*	Form of Restricted Stock Unit Agreement - Non-Plan Inducement Grant (incorporated herein by reference to Exhibit 10.6 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2018, File No. 001-10865)
10.18*	AMAG Pharmaceuticals, Inc. Long-Term Incentive Plan (included as Exhibit A to the Form of Award Notice under the AMAG Pharmaceuticals, Inc. Long-term Incentive Plan filed as Exhibit 10.16 to the Company's Annual Report on Form 10-K for the year ended December 31, 2018, File No. 001-10865)
10.19*	Form of Award Notice under the AMAG Pharmaceuticals, Inc. Long-term Incentive Plan (incorporated herein by reference to Exhibit 10.16 to the Company's Annual Report on Form 10-K for the year ended December 31, 2018, File No. 001-10865)
10.20*	Form of Employment Agreement between AMAG Pharmaceuticals, Inc. and each of its executive officers (other than William K. Heiden) (incorporated herein by reference to Exhibit 10.20 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019, File No. 001-10865)
10.21*	Amended and Restated Employment Agreement dated as of February 7, 2014 between AMAG Pharmaceuticals, Inc. and William K. Heiden (incorporated herein by reference to Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2014, File No. 001-10865)
10.22*	Amendment to Amended and Restated Employment Agreement, dated as of November 29, 2017, between AMAG Pharmaceuticals, Inc. and William K. Heiden (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed November 30, 2017, File No. 001-10865)
10.23*	Separation Letter between William Heiden and AMAG Pharmaceuticals, Inc., dated January 7, 2020 (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed January 9, 2020, File No. 001-10865)
10.24	Lease Agreement, dated as of June 10, 2013, by and between AMAG Pharmaceuticals, Inc. and BP BAY COLONY LLC and as amended through December 2019 (incorporated herein by reference to Exhibit 10.24 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019, File No. 001-10865)
10.25	Commercial Supply Agreement, dated effective as of August 29, 2012, by and between AMAG Pharmaceuticals, Inc. and Sigma-Aldrich, Inc. (incorporated herein by reference to Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2012, File No. 001-10865) (confidential treatment previously granted)
10.26	Amendment No.1 to Commercial Supply Agreement, dated October 3, 2013, by and between AMAG Pharmaceuticals, Inc. and Sigma-Aldrich, Inc. (incorporated herein by reference to Exhibit 10.54 to the Company's Annual Report on Form 10-K for the year ended December 31, 2013, File No. 001-10865) (confidential treatment previously granted)
10.27	Amendment No. 2 to Commercial Supply Agreement, dated April 28, 2015, by and between AMAG Pharmaceuticals, Inc. and Sigma-Aldrich, Inc. (incorporated herein by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2015, File No. 001-10865) (confidential treatment previously granted)

10.28	Amendment No. 3 to Commercial Supply Agreement, dated October 19, 2015, by and between the Company and Sigma-Aldrich, Inc. (incorporated herein by reference to Exhibit 10.36 to the Company's Annual Report on Form 10-K for the year ended December 31, 2015, File No. 001-10865) (confidential treatment previously granted)
10.29	Pharmaceutical Manufacturing and Supply Agreement, dated effective as of January 8, 2010, by and between AMAG Pharmaceuticals, Inc. and Patheon Manufacturing Services LLC (as assignee from DSM Pharmaceuticals, Inc.) (incorporated herein by reference to Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2012, File No. 001-10865) (confidential treatment previously granted)
10.30	Amendment No. 1 to Pharmaceutical Manufacturing and Supply Agreement, dated July 5, 2014, by and between AMAG Pharmaceuticals, Inc. and Patheon Manufacturing Services LLC (as assignee from DSM Pharmaceuticals, Inc.) (incorporated herein by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2014, File No. 001-10865)
10.31	Amendment No. 2 to Pharmaceutical Manufacturing and Supply Agreement, dated June 19, 2015, by and between AMAG Pharmaceuticals, Inc. and Patheon Manufacturing Services LLC (as assignee from DPI Newco LLC as assignee from DSM Pharmaceuticals, Inc.) (incorporated herein by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2015, File No. 001-10865) (confidential treatment previously granted)
10.32	Amended and Restated Technical Transfer and Supply Agreement, dated as of December 19, 2016, by and between AMAG Pharmaceuticals, Inc. and the Pfizer CentreOne Group of Pfizer, Inc. (incorporated herein by reference to Exhibit 10.34 to the Company's Annual Report on Form 10-K for the year ended December 31, 2016) (confidential treatment previously granted)
10.33	Development and License Agreement, dated September 30, 2014, by and between Lumara Health Inc and Antares Pharma, Inc. (incorporated herein by reference to Exhibit 10.42 to the Company's Annual Report on Form 10-K for the year ended December 31, 2015, File No. 001-10865) (confidential treatment previously granted)
10.34	First Amendment to Development and License Agreement, dated March 20, 2018, by and between AMAG Pharma USA, Inc. (f/k/a Lumara Health, Inc.), AMAG Pharmaceuticals, Inc. and Antares Pharma, Inc.(incorporated herein by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2018, File No. 001-10865) (confidential treatment previously granted)
10.35	Manufacturing Agreement, dated March 20, 2018, by and between AMAG Pharmaceuticals, Inc. and Antares Pharma, Inc. (incorporated herein by reference to Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2018, File No. 001-10865) (confidential treatment previously granted)
10.36	License Agreement, dated January 8, 2017, by and between AMAG Pharmaceuticals, Inc. and Palatin Technologies, Inc., (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed February 3, 2017, File No. 001-10865) (confidential treatment previously granted)
10.37	License Agreement, dated as of February 13, 2017, by and between AMAG Pharmaceuticals, Inc. and Endoceutics Inc. (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed April 5, 2017, File No. 001-10865) (confidential treatment previously granted)
10.38	Manufacturing and Supply Agreement, dated as of April 5, 2017, by and between AMAG Pharmaceuticals, Inc. and Endoceutics Inc. (incorporated herein by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed April 5, 2017, File No. 001-10865) (confidential treatment previously granted)
10.39	Commercial Supply Agreement, dated June 4, 2018, by and between AMAG Pharmaceuticals, Inc. and SAFC, Inc. (incorporated by reference to Exhibit 10.8 to the Company's Current Report on Form 10-Q/A filed December 21, 2018, File No. 001-10865) (Confidential treatment previously granted)
10.40	Contract Manufacturing Agreement, dated September 1, 2018, by and between AMAG Pharmaceuticals, Inc. and Fresenius Kabi Austria GmbH (incorporated by reference to Exhibit 10.43 to the Company's Annual Report on Form 10-K for the year ended December 31, 2018) (Confidential treatment previously granted
10.41	Product Supply Agreement, dated as of June 1, 2017, by and between AMAG Pharmaceuticals, Inc. and Pfizer, Inc. (incorporated herein by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2019, File No. 001-10865)
10.42	Commercial Supply Agreement, dated as of June 10, 2016, by and between AMAG Pharmaceuticals, Inc. (as assignee from Palatin Technologies, Inc.) and Catalent Belgium S.A. (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2019)
10.43	Supply Agreement, dated as of December 20, 2018, by and between AMAG Pharmaceuticals, Inc. and Ypsomed AG (incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2019)

10.44	Manufacturing Services Agreement, dated as of June 1, 2018, by and between AMAG Pharmaceuticals, Inc. and Lonza Ltd(incorporated by reference to Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2019)
10.45	Settlement Agreement, dated October 8, 2019, by and among AMAG Pharmaceuticals, Inc., Caligan Partners LP, Caligan Partners CV II LP, David E. Johnson and Paul Fonteyne (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed October 8, 2019, File No. 001-10865)
21.1	Subsidiaries of AMAG Pharmaceuticals, Inc. (incorporated herein by reference to Exhibit 21.1 to the Company's Annual Report on Form 10-K for the year ended December 31, 2019, File No. 001-10865)
23.1+	Consent of PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm
24.1	Power of Attorney (included on the signature page(s) hereto)
31.1+	Certification Pursuant to Rule 13a-14(a)/15d-14(a) of the Exchange Act, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
31.2+	Certification Pursuant to Rule 13a-14(a)/15d-14(a) of the Exchange Act, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
32.1++	Certification Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
32.2++	Certification Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
101.SCH+	Inline XBRL Taxonomy Extension Schema Document
101.CAL+	Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF+	Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB+	Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE+	Inline XBRL Taxonomy Extension Presentation Linkbase Document
104+	Cover Page Interactive Data File (formatted as inline XBRL with applicable taxonomy extension information contained in Exhibits 101.*)

+	Exhibits marked with a plus sign ("+") are filed herewith.
++	Exhibits marked with a double plus sign ("++") are furnished herewith.
*	Exhibits marked with a single asterisk reference management contracts, compensatory plans or arrangements, filed in response to Item 15(a)(3) of the instructions to Form 10-K.
	The other exhibits listed and not marked with a "+" or "++" have previously been filed with the SEC and are incorporated herein by reference, as indicated.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

AMAG PHARMACEUTICALS, INC.

By: /s/ Scott D. Myers
Scott D. Myers
President and Chief Executive Officer

Date: September 15, 2020

We, the undersigned officers and directors of AMAG Pharmaceuticals, Inc., hereby severally constitute and appoint Scott D. Myers and Brian Piekos, and each of them singly, our true and lawful attorneys, with full power to them and each of them singly, to sign for us in our names in the capacities indicated below, all amendments to this report, and generally to do all things in our names and on our behalf in such capacities to enable AMAG Pharmaceuticals, Inc. to comply with the provisions of the Securities Exchange Act of 1934, as amended, and all requirements of the Securities and Exchange Commission.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Name	Title	Date
/s/ Scott D. Myers Scott D. Myers	President and Chief Executive Officer (Principal Executive Officer) and Director	September 15, 2020
/s/ Brian Piekos Brian Piekos	Chief Financial Officer and Treasurer (Principal Financial and Accounting Officer)	September 15, 2020
/s/ John Fallon, M.D. John Fallon, M.D.	Director	September 15, 2020
/s/ Paul Fonteyne Paul Fonteyne	Director	September 15, 2020
/s/ David E. Johnson David E. Johnson	Director	September 15, 2020
/s/ Kathrine O'Brien Kathrine O'Brien	Director	September 15, 2020
/s/ Anne M. Phillips, M.D., FRCPC Anne M. Phillips, M.D., FRCPC	Director	September 15, 2020
/s/ Gino Santini Gino Santini	Director	September 15, 2020
/s/ Davey S. Scoon Davey S. Scoon	Director	September 15, 2020
/s/ James Sulat James Sulat	Director	September 15, 2020

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-3 (File No. 333-225604) and on Forms S-8 (File Nos. 333-148682, 333-159938, 333-168786, 333-182821, 333-190435, 333-197873, 333-203924, 333-211277, 333-218911, 333-226548 and 333-231542) of AMAG Pharmaceuticals, Inc. of our report dated March 6, 2020, except for the effects of the revision discussed in Note X to the consolidated financial statements and the matter discussed in the second paragraph of Management's Annual Report on Internal Control over Financial Reporting, as to which the date is September 15, 2020 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Amendment No. 1 on Form 10-K/A.

/s/ PricewaterhouseCoopers LLP

Boston, Massachusetts

September 15, 2020

Exhibit 31.1

CERTIFICATIONS

I, Scott D. Myers, certify that:

1. I have reviewed this Annual Report on Form 10-K/A of AMAG Pharmaceuticals, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: September 15, 2020

/s/ Scott D. Myers

Scott D. Myers

President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATIONS

I, Brian Piekos, certify that:

1. I have reviewed this Annual Report on Form 10-K/A of AMAG Pharmaceuticals, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: September 15, 2020

/s/ Brian Piekos

Brian Piekos

Executive Vice President, Chief Financial Officer and Treasurer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of AMAG Pharmaceuticals, Inc. (the "Company") on Form 10-K/A for the year ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Scott D. Myers, President and Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Scott D. Myers

Scott D. Myers
President and Chief Executive Officer
(Principal Executive Officer)

September 15, 2020

Exhibit 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of AMAG Pharmaceuticals, Inc. (the "Company") on Form 10-K/A for the year ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Brian Piekos, Executive Vice President, Chief Financial Officer and Treasurer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Brian Piekos

Brian Piekos
Executive Vice President, Chief Financial Officer and
Treasurer (Principal Financial Officer)

September 15, 2020