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

FORM 10-Q

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

For the quarterly period ended March 31, 2020

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: 001-36042

PRECIGEN, INC.

(Exact name of registrant as specified in its charter)

Virginia	**26-0084895**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification Number)**
20374 Seneca Meadows Parkway Germantown, Maryland	**20876**
(Address of principal executive offices)	**(Zip Code)**

(301) 556-9900

(Registrant's telephone number, including area code)

N/A

(Former name, former address and former fiscal year, if changed since last report date)

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

Title of each class	**Trading Symbol(s)**	**Name of each exchange on which registered**
Common Stock, no par value	PGEN	Nasdaq Global Select Market

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 (§232.405 of this chapter) 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 Exchange Act). Yes ☐ No ☒

As of April 30, 2020, 171,014,250 shares of common stock, no par value per share, were issued and outstanding.

PRECIGEN, INC.

FORM 10-Q
TABLE OF CONTENTS

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Special Note Regarding Forward-Looking Statements

This Quarterly Report contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, which statements involve substantial risks and uncertainties. All statements, other than statements of historical facts, included in this Quarterly Report, including statements regarding our strategy; future events, including their outcome or timing; future operations; future financial position; future revenue; projected costs; prospects; plans; objectives of management; and expected market growth, are forward-looking statements. The words "aim", "anticipate", "assume", "believe", "continue", "could", "due", "estimate", "expect", "intend", "may", "plan", "predict", "potential", "positioned", "project", "seek", "should", "target", "will", "would", and the negatives of these terms or similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. These forward-looking statements include, among other things, statements about:

- our ability to successfully enter new markets or develop product candidates, including the expected timing and results of investigational studies and preclinical and clinical trials, and our research and development programs;
- the timing or likelihood of regulatory filings for any product candidates we develop and our ability to obtain and maintain regulatory approvals for such product candidates for any indication;
- our intentions and ability to successfully commercialize our product candidates;
- the rate and degree of market acceptance of any products developed by us;
- our ability to successfully execute and achieve benefits from our recent leadership transition plan and organizational restructuring;
- our efforts to hold or generate significant operating capital, including through partnering, potential asset sales of our non-healthcare assets, and operating cost reductions;
- our cash position;
- any delays or potential delays to our clinical trials as a result of the COVID-19 pandemic;
- our estimates regarding expenses, future revenue, capital requirements, and our need for additional financing;
- our strategy and overall approach to our business model, including our efforts to focus our business in the healthcare industry;
- our ability to adapt to changes in laws, regulations, and policies;
- our reliance on and the performance of third parties, including exclusive channel collaborations, or ECCs, and joint ventures, or JVs;
- competition from existing technologies and products or new technologies and products that may emerge;
- our expectations related to the use of proceeds from our public offerings and other financing efforts;
- actual or anticipated variations in our operating results;
- market conditions in our industry;
- our ability to retain, recruit, and train key personnel, or the loss of key personnel as a result of illness or otherwise;
- our ability to successfully enter into optimal strategic relationships with our subsidiaries and operating companies that we may form in the future;
- the result of litigation proceedings or investigations that we currently face or may face in the future; and

- the effects, duration, and severity of the ongoing COVID-19 pandemic and the actions we and others have taken or may take in response.

Forward-looking statements may also concern our expectations relating to our subsidiaries and other affiliates. We caution you that the foregoing list may not contain all of the forward-looking statements made in this Quarterly Report.

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

You should read this Quarterly Report, the documents that we reference in this Quarterly Report, our Annual Report on Form 10-K for the year ended December 31, 2019, the other reports we have filed with the Securities and Exchange Commission, or SEC, and the documents that we have filed as exhibits to our filings with the SEC completely and with the understanding that our actual future results may be materially different from what we expect. We do not assume any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law.

PART I. FINANCIAL INFORMATION

Item 1. Condensed Consolidated Financial Statements

Precigen, Inc. and Subsidiaries
Condensed Consolidated Balance Sheets
(Unaudited)

(Amounts in thousands, except share data)	March 31, 2020	December 31, 2019
Assets		
Current assets		
Cash and cash equivalents	$ 37,840	$ 65,793
Short-term investments	111,332	9,260
Receivables		
Trade, less allowance for credit losses of $5,725 and $5,201 as of March 31, 2020 and December 31, 2019, respectively	19,376	20,650
Related parties, less allowance for credit losses of $2,312 as of March 31, 2020 and December 31, 2019	252	600
Other	351	4,978
Inventory	14,636	16,097
Prepaid expenses and other	5,596	6,444
Current assets held for sale	—	110,821
Total current assets	189,383	234,643
Property, plant and equipment, net	59,627	60,969
Intangible assets, net	65,489	68,346
Goodwill	63,703	63,754
Investments in affiliates	1,108	1,461
Right-of-use assets	24,036	25,228
Other assets	1,326	1,362
Total assets	$ 404,672	$ 455,763

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

Precigen, Inc. and Subsidiaries
Condensed Consolidated Balance Sheets
(Unaudited)

(Amounts in thousands, except share data)	March 31, 2020	December 31, 2019
Liabilities and Total Equity		
Current liabilities		
Accounts payable	$ 4,777	$ 5,917
Accrued compensation and benefits	7,209	14,091
Other accrued liabilities	9,972	12,049
Deferred revenue, including $0 and $877 from related parties as of March 31, 2020 and December 31, 2019, respectively	11,141	5,697
Lines of credit	1,205	1,922
Current portion of long-term debt, including $31,446 and $31,211 to related parties as of March 31, 2020 and December 31, 2019, respectively	31,886	31,670
Current portion of lease liabilities	4,308	4,182
Related party payables	139	51
Current liabilities held for sale	—	47,333
Total current liabilities	70,637	122,912
Long-term debt, net of current portion, including $25,000 to related parties as of March, 31, 2020 and December 31, 2019	188,730	186,321
Deferred revenue, net of current portion, including $31,020 and $30,182 from related parties as of March 31, 2020 and December 31, 2019, respectively	32,877	48,136
Lease liabilities, net of current portion	22,414	23,849
Deferred tax liabilities	2,785	2,834
Total liabilities	317,443	384,052
Commitments and contingencies (Note 16)		
Total shareholders' equity		
Common stock, no par value, 400,000,000 shares authorized as of March 31, 2020 and December 31, 2019; 170,656,834 shares and 163,274,880 shares issued and outstanding as of March 31, 2020 and December 31, 2019, respectively	—	—
Additional paid-in capital	1,797,450	1,752,048
Accumulated deficit	(1,708,867)	(1,652,869)
Accumulated other comprehensive loss	(1,354)	(27,468)
Total shareholders' equity	87,229	71,711
Total liabilities and shareholders' equity	$ 404,672	$ 455,763

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

Precigen, Inc. and Subsidiaries
Condensed Consolidated Statements of Operations
(Unaudited)

(Amounts in thousands, except share and per share data)	Three Months Ended March 31, 2020	Three Months Ended March 31, 2019
Revenues		
Collaboration and licensing revenues, including $198 and $4,790 from related parties during the three months ended March 31, 2020 and 2019, respectively	$ 10,721	$ 5,971
Product revenues	4,961	4,837
Service revenues	13,946	11,383
Other revenues	210	394
Total revenues	29,838	22,585
Operating Expenses		
Cost of products	6,089	7,722
Cost of services	7,536	7,092
Research and development	18,891	26,938
Selling, general and administrative	23,018	31,049
Total operating expenses	55,534	72,801
Operating loss	(25,696)	(50,216)
Other Expense, Net		
Unrealized and realized appreciation in fair value of equity securities and preferred stock, net	—	449
Interest expense	(4,592)	(4,305)
Interest and dividend income	673	1,361
Other income, net	64	546
Total other expense, net	(3,855)	(1,949)
Equity in net loss of affiliates	(351)	(748)
Loss from continuing operations before income taxes	(29,902)	(52,913)
Income tax benefit (expense)	(40)	13
Loss from continuing operations	(29,942)	(52,900)
Loss from discontinued operations, net of income taxes	(26,056)	(9,236)
Net loss	$ (55,998)	$ (62,136)
Net loss attributable to the noncontrolling interests	—	1,427
Net loss attributable to Precigen	$ (55,998)	$ (60,709)
Amounts Attributable to Precigen		
Net loss from continuing operations attributable to Precigen	$ (29,942)	$ (51,473)
Net loss from discontinued operations attributable to Precigen	(26,056)	(9,236)
Net loss attributable to Precigen	$ (55,998)	$ (60,709)
Net Loss per Share		
Net loss from continuing operations attributable to Precigen per share, basic and diluted	$ (0.19)	$ (0.34)
Net loss from discontinued operations attributable to Precigen per share, basic and diluted	(0.16)	(0.06)
Net loss attributable to Precigen per share, basic and diluted	$ (0.35)	$ (0.40)
Weighted average shares outstanding, basic and diluted	160,338,743	152,948,058

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

Precigen, Inc. and Subsidiaries
Condensed Consolidated Statements of Comprehensive Loss
(Unaudited)

(Amounts in thousands)	Three Months Ended March 31, 2020	2019
Net loss	$ (55,998)	$ (62,136)
Other comprehensive income (loss):		
Unrealized gain on investments	572	47
Gain (loss) on foreign currency translation adjustments	(1,415)	285
Release of cumulative foreign currency translation adjustments to loss from discontinued operations	26,957	—
Comprehensive loss	(29,884)	(61,804)
Comprehensive loss attributable to the noncontrolling interests	—	1,382
Comprehensive loss attributable to Precigen	$ (29,884)	$ (60,422)

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

Precigen, Inc. and Subsidiaries
Condensed Consolidated Statements of Shareholders' and Total Equity
(Unaudited)

(Amounts in thousands, except share data)	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Total Shareholders' Equity
Balances at December 31, 2019	163,274,880	$ —	$1,752,048	$ (27,468)	$(1,652,869)	$ 71,711
Stock-based compensation expense	—	—	4,372	—	—	4,372
Shares issued upon vesting of restricted stock units	668,786	—	—	—	—	—
Shares issued for accrued compensation	347,989	—	5,100	—	—	5,100
Shares issued as payment for services	392,483	—	930	—	—	930
Shares issued in private placement	5,972,696	—	35,000	—	—	35,000
Net loss	—	—	—	—	(55,998)	(55,998)
Release of cumulative translation adjustments to loss from discontinued operations	—	—	—	26,957	—	26,957
Other comprehensive loss	—	—	—	(843)	—	(843)
Balances at March 31, 2020	170,656,834	$ —	$1,797,450	$ (1,354)	$(1,708,867)	$ 87,229

(Amounts in thousands, except share data)	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Total Precigen Shareholders' Equity	Noncontrolling Interests	Total Equity
Balances at December 31, 2018	160,020,466	$ —	$1,722,012	$ (28,612)	$(1,330,545)	$ 362,855	$ 15,867	$ 378,722
Stock-based compensation expense	—	—	8,990	—	—	8,990	64	9,054
Shares issued upon vesting of restricted stock units and for exercises of stock options and warrants	286,637	—	57	—	—	57	250	307
Shares issued for accrued compensation	150,908	—	1,102	—	—	1,102	—	1,102
Shares issued as payment for services	157,405	—	831	—	—	831	—	831
Shares and warrants issued in public offerings, net of issuance costs	—	—	—	—	—	—	6,611	6,611
Adjustments for noncontrolling interests	—	—	(384)	—	—	(384)	384	—
Net loss	—	—	—	—	(60,709)	(60,709)	(1,427)	(62,136)
Other comprehensive income	—	—	—	287	—	287	45	332
Balances at March 31, 2019	160,615,416	$ —	$1,732,608	$ (28,325)	$(1,391,254)	$ 313,029	$ 21,794	$ 334,823

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

Precigen, Inc. and Subsidiaries
Condensed Consolidated Statements of Cash Flows
(Unaudited)

(Amounts in thousands)	Three Months Ended March 31, 2020	2019
Cash flows from operating activities		
Net loss	$ (55,998)	$ (62,136)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	4,810	6,577
Loss on disposals of assets, net	217	493
Gain on sale of discontinued operations	(672)	—
Loss on release of cumulative foreign currency translation adjustments to loss from discontinued operations	26,957	—
Unrealized and realized (appreciation) depreciation on equity securities and preferred stock, net	106	(70)
Amortization of discounts on investments, net	(233)	(352)
Equity in net loss of affiliates	389	1,640
Stock-based compensation expense	4,372	9,054
Shares issued as payment for services	930	831
Provision for credit losses	523	64
Accretion of debt discount and amortization of deferred financing costs	2,517	2,213
Deferred income taxes	—	(508)
Other noncash items	239	235
Changes in operating assets and liabilities:		
Receivables:		
Trade	438	1,306
Related parties	25	1,584
Other	1,736	642
Inventory	1,202	1,381
Prepaid expenses and other	927	(322)
Other assets	7	13
Accounts payable	(917)	(1,237)
Accrued compensation and benefits	(1,941)	(1,788)
Other accrued liabilities	(2,974)	(6,129)
Deferred revenue	(10,437)	1,330
Lease liabilities	(53)	29
Related party payables	87	1,916
Net cash used in operating activities	(27,743)	(43,234)
Cash flows from investing activities		
Purchases of investments	(119,267)	—
Sales and maturities of investments	18,000	45,000
Proceeds from sales of equity securities	—	418
Investments in affiliates	—	(370)
Purchases of property, plant and equipment	(3,152)	(11,523)
Proceeds from sale of assets	684	67
Proceeds from sale of discontinued operations, net of cash sold	64,240	—
Proceeds from repayment of notes receivable	2,942	—
Net cash provided by (used in) investing activities	(36,553)	33,592

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

Precigen, Inc. and Subsidiaries
Condensed Consolidated Statements of Cash Flows
(Unaudited)

(Amounts in thousands)	Three Months Ended March 31, 2020	2019
Cash flows from financing activities		
Proceeds from issuance of shares in a private placement	35,000	—
Proceeds from issuance of shares and warrants in public offering, net of issuance costs	—	6,611
Advances from lines of credit	8,718	1,408
Repayments of advances from lines of credit	(9,435)	(1,597)
Proceeds from long-term debt, net of issuance costs	—	376
Payments of long-term debt	(132)	(178)
Proceeds from stock option and warrant exercises	—	307
Net cash provided by financing activities	34,151	6,927
Effect of exchange rate changes on cash, cash equivalents, and restricted cash	(39)	(504)
Net decrease in cash, cash equivalents, and restricted cash	(30,184)	(3,219)
Cash, cash equivalents, and restricted cash		
Beginning of period	68,434	110,182
End of period	$ 38,250	$ 106,963
Supplemental disclosure of cash flow information		
Cash paid during the period for interest	$ 3,568	$ 77
Cash paid during the period for income taxes	40	30
Significant noncash activities		
Accrued compensation paid in equity awards	$ 5,100	$ 1,102
Purchases of property and equipment included in accounts payable and other accrued liabilities	369	2,531

The following table provides a reconciliation of the cash, cash equivalents, and restricted cash balances as of March 31, 2020 and December 31, 2019 as shown above:

	March 31, 2020	December 31, 2019
Cash and cash equivalents	$ 37,840	$ 65,793
Cash and cash equivalents included in current assets held for sale	—	2,223
Restricted cash included in other assets	410	418
Cash, cash equivalents, and restricted cash	$ 38,250	$ 68,434

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

Precigen, Inc. and Subsidiaries
Notes to the Condensed Consolidated Financial Statements
(Unaudited)
(Amounts in thousands, except share and per share data)

1. Organization

Precigen, Inc. ("Precigen"), a Virginia corporation, is a synthetic biology company with an increasing focus on its discovery and clinical stage activities to advance the next generation of gene and cellular therapies to target the most urgent and intractable challenges in immuno-oncology, autoimmune disorders, and infectious diseases.

PGEN Therapeutics, Inc. ("PGEN Therapeutics") is a dedicated discovery and clinical stage biopharmaceutical company advancing the next generation of gene and cellular therapies using precision technology to target urgent and intractable diseases in immuno-oncology, autoimmune disorders, and infectious diseases. PGEN Therapeutics is a wholly owned subsidiary of Precigen with primary operations in Maryland.

Precigen ActoBio, Inc. ("ActoBio") is pioneering a proprietary class of microbe-based biopharmaceuticals that enable expression and local delivery of disease-modifying therapeutics and is a wholly owned subsidiary of Precigen with primary operations in Belgium.

Exemplar Genetics, LLC, doing business as Precigen Exemplar, ("Exemplar") is committed to enabling the study of life-threatening human diseases through the development of MiniSwine Yucatan miniature pig research models and services, as well as enabling the production of cells and organs in its genetically engineered swine for regenerative medicine applications and is a wholly owned subsidiary of Precigen with primary operations in Iowa.

Trans Ova Genetics, L.C. ("Trans Ova"), and Progentus, L.C. ("Progentus"), providers of reproductive technologies, including services and products sold to cattle breeders and other producers, are wholly owned subsidiaries with primary operations in California, Iowa, Maryland, Missouri, New York, Oklahoma, Texas, and Washington.

Effective October 1, 2019, Precigen transferred substantially all of its proprietary methane bioconversion platform assets to a wholly owned subsidiary, MBP Titan LLC ("MBP Titan"), with primary operations in California. MBP Titan's proprietary methane bioconversion platform is designed to turn natural gas into more valuable and usable energy and chemical products through novel, highly engineered bacteria that utilize specific energy feedstocks. See Note 2 for further discussion. Prior to October 1, 2019, the operation transferred to MBP Titan was an operating division within Precigen.

Through April 8, 2019, Precigen consolidated AquaBounty Technologies, Inc. ("AquaBounty"), a company focused on improving productivity in commercial aquaculture and whose common stock is listed on the Nasdaq Stock Market. On April 9, 2019, AquaBounty completed an underwritten public offering that resulted in Precigen no longer having the contractual right to control AquaBounty's board of directors, and accordingly, Precigen deconsolidated AquaBounty. After deconsolidating the entity in April 2019, Precigen held its AquaBounty equity securities, which it accounted for using the fair value option, until October 2019 when the independent members of the Company's board of directors, with the recommendation of the audit committee and an independent special committee of the Board, unanimously approved the sale of the Company's common shares held in AquaBounty to an affiliate of Third Security, LLC ("Third Security"), a related party.

On January 31, 2020, Precigen completed the sale of the majority of its bioengineering assets and operations to an affiliate of Third Security, which are presented as discontinued operations for all periods presented. See Notes 3 and 13 for further discussion.

Precigen and its consolidated subsidiaries are hereinafter referred to as the "Company."

2. Summary of Significant Accounting Policies

Basis of Presentation

The accompanying interim condensed consolidated financial statements are unaudited and have been prepared in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP"). Certain information and footnote disclosures normally included in the Company's annual financial statements have been condensed or omitted. These interim condensed consolidated financial statements, in the opinion of management, reflect all normal recurring adjustments necessary for fair statement of the Company's financial position as of March 31, 2020 and results of operations and cash flows

for the interim periods ended March 31, 2020 and 2019. The year-end condensed consolidated balance sheet data was derived from the Company's audited financial statements but does not include all disclosures required by U.S. GAAP. These interim financial results are not necessarily indicative of the results to be expected for the year ending December 31, 2020, or for any other future annual or interim period. The accompanying interim unaudited condensed consolidated financial statements should be read in conjunction with the audited consolidated financial statements and related notes thereto included in the Company's Annual Report on Form 10-K for the year ended December 31, 2019.

The accompanying condensed consolidated financial statements reflect the operations of the Company and its subsidiaries. All intercompany accounts and transactions have been eliminated.

Liquidity

Management believes that existing liquid assets as of March 31, 2020 will allow the Company to continue its operations for at least a year from the issuance date of these condensed consolidated financial statements. These condensed consolidated financial statements are presented in United States dollars and are prepared under U.S. GAAP. The Company is subject to a number of risks similar to those of other companies conducting high-risk, early-stage research and development of product candidates. Principal among these risks are dependence on key individuals and intellectual property, competition from other products and companies, and the technical risks associated with the successful research, development and clinical manufacturing of its and its collaborators' product candidates. Additionally, the accompanying condensed consolidated financial statements have been prepared on a going concern basis, which contemplates the realization of assets and the satisfaction of liabilities in the normal course of business. During the three months ended March 31, 2020, the Company incurred a net loss attributable to Precigen of $55,998 and, as of March 31, 2020, has an accumulated deficit of $1,708,867. Management expects operating losses and negative cash flows to continue for the foreseeable future and, as a result, the Company will require additional capital to fund its operations and execute its business plan. In the absence of a significant source of recurring revenue, the Company's long-term success is dependent upon its ability to continue to raise additional capital in order to fund ongoing research and development, reduce uses of cash for operating and investing activities for non-healthcare businesses, obtain regulatory approval of its products, successfully commercialize its products, generate revenue, meet its obligations and, ultimately, attain profitable operations.

Risks and Uncertainties

In March 2020, the World Health Organization declared the novel strain of coronavirus, now known as COVID-19, a pandemic. COVID-19 has and continues to have an extensive impact on the global health and economic environments.

Commencing in the second half of March, the Company's healthcare business began to experience delays to certain of its clinical trials as a result of COVID-19. For example, starting in March, ActoBio temporarily suspended the Phase 1b/2a cohort for AG019 as a proactive measure to protect the welfare and safety of patients, caregivers, clinical site staff, its employees, and contractors. Additionally, from April to May 2020, enrollment of new patients in the Company's PRGN-3005 Phase 1 trial was temporarily suspended, due to a mandated hold on certain early and late-stage clinical trials at the Fred Hutchinson Cancer Research Center in Seattle instituted in light of the COVID-19 pandemic. Neither of these delays was related to safety issues in the studies, and recruitment has resumed in the Company's PRGN-3005 trial.

In April 2020, as a result of market uncertainty driven by the COVID-19 pandemic and the current state of the energy sector, the Company began the process of temporarily shutting down MBP Titan operations and assessing the appropriate next steps with respect to the future of MBP Titan.

The Company is closely monitoring the impact of COVID-19 on these and other aspects of its business, including Trans Ova and Exemplar. Given the dynamic nature of these circumstances, the full impact of the COVID-19 pandemic on the Company's ongoing business, results of operations, and overall financial performance for the balance of 2020 and beyond cannot be reasonably estimated at this time, and it could have a material adverse effect on the Company's results of operations, cash flows, and financial position, including resulting impairments to goodwill, long-lived assets, and additional credit losses.

Equity Method Investments

The Company accounts for its investments in each of its JVs and for its investments in start-up entities backed by the Harvest Intrexon Enterprise Fund I, LP ("Harvest"), all of which are related parties, using the equity method of accounting based upon relative ownership interest. The Company's investments in these entities are included in investments in affiliates in the accompanying condensed consolidated balance sheets. See additional discussion related to certain of the Company's JVs in Note 4.

Variable Interest Entities

As of March 31, 2020 and December 31, 2019, the Company determined that certain of its collaborators and JVs, as well as Harvest, were variable interest entities ("VIEs"). The Company was not the primary beneficiary for these entities since it did not have the power to direct the activities that most significantly impact the economic performance of the VIEs. The Company's aggregate investment balances of these VIEs as of March 31, 2020 and December 31, 2019 were $1,108 and $1,461, respectively, which represents the Company's maximum risk of loss related to the identified VIEs. See Note 4 for discussion of the Company's future funding commitments for the significant JVs.

Accounts Receivable

Effective January 1, 2020, the Company applies Financial Accounting Standards Board ("FASB") Accounting Standard Update ("ASU") 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* ("ASU 2016-13"). This ASU replaces the incurred loss impairment model with an expected credit loss impairment model for financial instruments, including trade receivables. The amendment requires entities to consider forward-looking information to estimate expected credit losses, resulting in earlier recognition of losses for receivables that are current or not yet due, which were not considered under the previous accounting guidance.

The Company is exposed to credit losses primarily through sales of products and services by Trans Ova in the normal course of business. The Company's expected loss allowance methodology for accounts receivable is developed using historical collection experience, current and future economic and market conditions, and a review of the current status of customers' trade accounts receivables. The Company's monitoring activities include timely account reconciliation, routine follow-up on past due accounts, and consideration of customers' financial condition, as well as macroeconomic conditions. Past due status is determined based upon contractual terms. Balances are written off at the point when collection attempts have been exhausted.

Estimates are used to determine the loss allowance, which is based on assessment of anticipated payment and other historical, current, and future information that is reasonably available.

The following table shows the activity in the allowance for credit losses for the three months ended March 31, 2020:

Balance at December 31, 2019	$	7,513
Charged to operating expenses		523
Write offs of accounts receivable, net of recoveries		1
Balance at March 31, 2020	$	8,037

Segment Information

The Company realigned its business in April 2019, and as a result, its chief operating decision maker ("CODM") now regularly reviews disaggregated financial information for various operating segments. As of March 31, 2020, the Company's reportable segments were (i) PGEN Therapeutics, (ii) ActoBio, (iii) MBP Titan, (iv) Trans Ova, and (v) the Human Biotherapeutics division, which is an operating division of Precigen. All of Precigen's consolidated subsidiaries and operating divisions that did not meet the quantitative thresholds to report separately are combined and reported in a single category, All Other. See Note 1 for a description of PGEN Therapeutics, ActoBio, MBP Titan, and Trans Ova. See Note 19 for a description of the Human Biotherapeutics division. Corporate expenses, which are not allocated to the segments and are managed at a consolidated level, include costs associated with general and administrative functions, including the Company's finance, accounting, legal, human resources, information technology, corporate communication, and investor relations functions. Corporate expenses exclude interest expense, depreciation and amortization, stock-based compensation expense, and equity in net loss of affiliates and include unrealized and realized gains and losses on the Company's securities portfolio as well as dividend income. The Company's segment presentation has been recast to retrospectively reflect the change from one reportable segment to multiple reportable segments. See Note 19 for further discussion of the Company's segments.

Use of Estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates.

Recently Adopted Accounting Pronouncements

In October 2018, the FASB issued ASU 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction between Topic 808 and Topic 606* ("ASU 2018-18"). The provisions of ASU 2018-18 clarify when certain transactions between collaborative arrangement participants should be accounted for under Accounting Standards Codification ("ASC") Topic 606, *Revenue from Contracts with Customers* ("ASC 606"), and incorporates unit-of-account guidance consistent with ASC 606 to aid in this determination. The Company adopted this standard effective January 1, 2020, and there was no impact to the accompanying consolidated financial statements.

In October 2018, the FASB issued ASU 2018-17, *Consolidation (Topic 810): Targeted Improvements to Related Party Guidance for Variable Interest Entities* ("ASU 2018-17"). The provisions of ASU 2018-17 modify the guidance under ASC Topic 810 related to the evaluation of indirect interests held through related parties under common control when determining whether fees paid to decision makers and service providers are variable interests. Indirect interests held through related parties that are under common control are no longer considered to be the equivalent of direct interests in their entirety and instead should be considered on a proportional basis. This guidance more closely aligns with accounting of how indirect interests held through related parties under common control are considered for determining whether a reporting entity must consolidate a VIE. The Company adopted this standard effective January 1, 2020, and there was no impact to the accompanying consolidated financial statements.

In August 2018, the FASB issued ASU 2018-15, *Intangibles - Goodwill and Other-Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract* ("ASU 2018-15"). The provisions of ASU 2018-15 clarify the accounting for implementation costs of a hosting arrangement that is a service contract. The new standard requires an entity (customer) in a hosting arrangement that is a service contract to follow existing internal-use software guidance to determine which implementation costs to capitalize as an asset related to the service contract and which costs to expense. Capitalized implementation costs of a hosting arrangement that is a service contract should be amortized over the term of the hosting arrangement, which might extend beyond the noncancelable period if there are options to extend or terminate. ASU 2018-15 also specifies the financial statement presentation of capitalized implementation costs and related amortization, in addition to required disclosures for material capitalized implementation costs related to hosting arrangements that are service contracts. The Company adopted this standard effective January 1, 2020, on a prospective basis and there was no material impact to the accompanying consolidated financial statements.

In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurements (Topic 820): Disclosure Framework-Changes to the Disclosure Requirements for Fair Value Measurements* ("ASU 2018-13"). The provisions of ASU 2018-13 modify the disclosures related to recurring and nonrecurring fair value measurements. Disclosures related to the transfer of assets between Level 1 and Level 2 hierarchies have been eliminated and various additional disclosures related to Level 3 fair value measurements have been added, modified, or removed. The Company adopted this standard effective January 1, 2020, and there was no impact to the accompanying consolidated financial statements.

In June 2016, the FASB issued ASU 2016-13, which modifies the impairment model to utilize an expected loss methodology in place of the previous incurred loss methodology, and requires a consideration of a broader range of reasonable and supportable information to inform credit loss estimates. The Company adopted this standard effective January 1, 2020, and there was no material impact to the accompanying consolidated financial statements.

Recently Issued Accounting Pronouncements

In December 2019, the FASB issued ASU No. 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes*. This ASU is intended to simplify various aspects related to accounting for income taxes by removing certain exceptions to the general principles in Topic 740 and clarifying certain aspects of the current guidance to promote consistency among reporting entities. ASU 2019-12 is effective for annual periods beginning after December 15, 2020 and interim periods within those annual periods, with early adoption permitted. An entity that elects early adoption must adopt all the amendments in the same period. Most amendments within this ASU are required to be applied on a prospective basis, while certain amendments must be applied on a retrospective or modified retrospective basis. The Company is currently evaluating the impact of the new standard on its consolidated financial statements and related disclosures.

3. Discontinued Operations

On January 1, 2020, the Company and TS Biotechnology Holdings, LLC ("TS Biotechnology"), a related party and an entity managed by Third Security, entered into a Stock and Asset Purchase Agreement pursuant to which the Company agreed to sell a majority of the Company's bioengineering assets and operations to TS Biotechnology for $53,000 and certain contingent

payment rights (the "TS Biotechnology Sale"). The TS Biotechnology Sale closed on January 31, 2020. The assets and operations sold in the TS Biotechnology Sale included the following wholly owned subsidiaries, as well as certain equity securities held in Oragenics, Inc. ("Oragenics") and SH Parent, Inc. that were directly related to the subsidiaries sold:

- Intrexon Produce Holdings, Inc., the parent company of two companies focused on the development and sale of non-browning apples, Okanagan Specialty Fruits, Inc. and Fruit Orchard Holdings, Inc. (collectively referred herein as "Okanagan");
- Intrexon UK Holdings, Inc., the parent company of Oxitec Limited and its subsidiaries, which is a pioneering company in biological insect solutions (referred to herein as "Oxitec");
- ILH Holdings, Inc., a company focused on the production of certain fine chemicals focused primarily on microbial production of therapeutic compounds ("Fine Chemicals"); and
- Blue Marble AgBio LLC which was formed in January 2020 and included certain agriculture biotechnology assets and operations which were previously an operating division within Precigen ("AgBio").

Additionally, on January 2, 2020, the Company sold its equity interest in EnviroFlight, LLC ("EnviroFlight"), a JV with Darling Ingredients, Inc. ("Darling"), and related intellectual property rights to Darling for $12,200 (the "EnviroFlight Sale"). Unless referenced separately, the TS Biotechnology Sale and the EnviroFlight Sale are collectively referred to as the "Transactions".

The Transactions were approved by the Company's independent members of the board of directors in December 2019. The Transactions represented a strategic shift of the Company towards the Company becoming a primarily healthcare company advancing technologies and products that address complex healthcare challenges. The assets, liabilities, and operations related to the Transactions are reclassified and presented as discontinued operations in the accompanying condensed consolidated financial statements for all periods.

Upon the closing of the TS Biotechnology Sale in January 2020, the cumulative foreign currency translation losses totaling $26,957 were released to earnings and included in loss from discontinued operations. See further discussion below.

The carrying values of the major classes of assets and liabilities included in assets and liabilities held for sale for the Transactions as of December 31, 2019 are as follows:

	TS Biotechnology Sale	EnviroFlight Sale	Total
Assets			
Cash and cash equivalents	$ 2,223	$ —	$ 2,223
Other current assets	9,698	—	9,698
Property, plant and equipment, net	51,975	—	51,975
Intangible assets, net	20,891	4,383	25,274
Investments in affiliates	—	7,817	7,817
Right-of-use assets	13,622	—	13,622
Other noncurrent assets	212	—	212
Total assets held for sale	$ 98,621	$ 12,200	$ 110,821
Liabilities			
Deferred revenue, current (1)	$ 8,723	$ —	$ 8,723
Operating lease liabilities, current	2,459	—	2,459
Other current liabilities	3,058	41	3,099
Deferred revenue, net of current portion (2)	19,410	—	19,410
Operating lease liabilities, net of current portion	12,623	—	12,623
Other long-term liabilities	1,019	—	1,019
Total liabilities held for sale	$ 47,292	$ 41	$ 47,333

(1) Includes deferred revenue, current, from related parties of $1,243.

(2) Includes deferred revenue, net of current portion, from related parties of $6,836.

The following tables present the financial results of discontinued operations:

	Three Months Ended March 31, 2020		
	TS Biotechnology Sale	EnviroFlight Sale	Total
Revenue (1)	$ 1,294	$ —	$ 1,294
Operating expenses	896	—	896
Operating income	398	—	398
Gain on sale of discontinued operations	633	39	672
Loss on release of cumulative foreign currency translation adjustment	(26,957)	—	(26,957)
Other expense, net	(129)	—	(129)
Equity in net loss of affiliates	—	(38)	(38)
Loss before income taxes	(26,055)	1	(26,054)
Income tax expense	(2)	—	(2)
Loss from discontinued operations	$ (26,057)	$ 1	$ (26,056)

(1) Includes revenue recognized from related parties of $436.

	Three Months Ended March 31, 2019		
	TS Biotechnology Sale	EnviroFlight Sale	Total
Revenue (1)	$ 750	$ —	$ 750
Operating expenses	9,119	118	9,237
Operating loss	(8,369)	(118)	(8,487)
Other expense, net	(422)	—	(422)
Equity in net loss of affiliates	—	(892)	(892)
Loss before income taxes	(8,791)	(1,010)	(9,801)
Income tax benefit	565	—	565
Loss from discontinued operations	$ (8,226)	$ (1,010)	$ (9,236)

(1) Includes the reversal of revenue recognized from related parties of $978.

The following table presents the significant non-cash items and purchases of property, plant and equipment for the discontinued operations that are included in the accompanying condensed consolidated statements of cash flows.

	Three Months Ended March 31,	
	2020	2019
Adjustments to reconcile net loss to net cash used in operating activities		
Depreciation and amortization	$ —	$ 1,233
Unrealized and realized depreciation on equity securities and preferred stock, net	106	379
Equity in net loss of EnviroFlight	38	892
Stock-based compensation expense	(1,346)	806
Deferred income taxes	—	(481)
Gain on sale of discontinued operations	(672)	—
Loss on release of cumulative foreign currency translation adjustment	26,957	—
Cash flows from investing activities		
Purchases of property, plant and equipment	(382)	(7,700)

Also see Note 13 below.

Equity Method Investments

The Company accounted for its investment in EnviroFlight using the equity method of accounting.

Summarized financial data for equity method investments included in discontinued operations are shown in the following tables for the periods in which the Company held the equity method investments.

	December 31, 2019
Current assets	$ 703
Noncurrent assets	30,549
Total assets	31,252
Current liabilities	2,352
Non-current liabilities	88
Total liabilities	2,440
Net assets	$ 28,812

	Three Months Ended March 31,	
	2020	2019
Revenues	$ 16	$ 94
Operating expenses	92	1,881
Operating loss	(76)	(1,787)
Other, net	—	4
Net loss	$ (76)	$ (1,783)

Where applicable, the notes to the accompanying condensed consolidated financial statements have been updated to reflect information pertaining to the Company's continuing operations.

Out-of-Period Adjustment

During the three months ended March 31, 2020, the Company recorded an out-of-period adjustment of $26,572 to loss from discontinued operations which relates to the effect of cumulative foreign translation losses associated with the entities sold in the TS Biotechnology Transaction. This charge, which is entirely noncash, should have been recorded in the year ended December 31, 2019 as an additional impairment charge included in loss from discontinued operations. There was no impact to net loss from continuing operations, cash and short-term investments, cash flows, or Segment Adjusted EBITDA. The error also had no impact on the cash consideration received upon closing of the TS Biotechnology Transaction nor the representations and warranties made by the Company in the transaction. The Company evaluated the effects of this out-of-period adjustment, both qualitatively and quantitatively, and concluded that this adjustment was not material to the Company's financial position or results of operations for the three months ended March 31, 2020 or the year ended December 31, 2019.

4. Investments in Joint Ventures

Intrexon Energy Partners

In March 2014, the Company and certain investors (the "IEP Investors"), including an affiliate of Third Security, a related party, entered into a Limited Liability Company Agreement that governs the affairs and conduct of business of Intrexon Energy Partners, LLC ("Intrexon Energy Partners"), a JV formed to optimize and scale-up the Company's methane bioconversion platform technology for the production of certain fuels and lubricants. The Company also entered into an ECC with Intrexon Energy Partners providing exclusive rights to the Company's technology for the use in bioconversion for the production of certain fuels and lubricants, as a result of which the Company received a technology access fee of $25,000 while retaining a 50% membership interest in Intrexon Energy Partners. The IEP Investors made initial capital contributions, totaling $25,000 in

the aggregate, in exchange for pro rata membership interests in Intrexon Energy Partners totaling 50%. In addition, Precigen has committed to make capital contributions of up to $25,000, and the IEP Investors, as a group and pro rata in accordance with their respective membership interests in Intrexon Energy Partners, have committed to make additional capital contributions of up to $25,000, at the request of Intrexon Energy Partners' board of managers (the "Intrexon Energy Partners Board") and subject to certain limitations. As of March 31, 2020, the Company's remaining commitment was $4,225. Intrexon Energy Partners is governed by the Intrexon Energy Partners Board, which has five members. Two members of the Intrexon Energy Partners Board are designated by the Company and three members are designated by a majority of the IEP Investors. The Company and the IEP Investors have the right, but not the obligation, to make additional capital contributions above the initial limits when and if solicited by the Intrexon Energy Partners Board.

The Company's investment in Intrexon Energy Partners was $(422) and $(423) as of March 31, 2020 and December 31, 2019, respectively, and is included in other accrued liabilities in the accompanying condensed consolidated balance sheets, which represents the Company's equity in losses for contractually committed contributions to Intrexon Energy Partners.

Intrexon Energy Partners II

In December 2015, the Company and certain investors (the "IEPII Investors"), including Harvest, entered into a Limited Liability Company Agreement that governs the affairs and conduct of business of Intrexon Energy Partners II, LLC ("Intrexon Energy Partners II"), a JV formed to utilize the Company's methane bioconversion platform technology for the production of 1,4-butanediol, an industrial chemical used to manufacture spandex, polyurethane, plastics, and polyester. The Company also entered into an ECC with Intrexon Energy Partners II that provides exclusive rights to the Company's technology for use in the field, as a result of which the Company received a technology access fee of $18,000 while retaining a 50% membership interest in Intrexon Energy Partners II. The IEPII Investors made initial capital contributions, totaling $18,000 in the aggregate, in exchange for pro rata membership interests in Intrexon Energy Partners II totaling 50%. In December 2015, the owners of Intrexon Energy Partners II made a capital contribution of $4,000, half of which was paid by the Company. Precigen has committed to make additional capital contributions of up to $10,000, and the IEPII Investors, as a group and pro rata in accordance with their respective membership interests in Intrexon Energy Partners II, have committed to make additional capital contributions of up to $10,000, at the request of Intrexon Energy Partners II's board of managers (the "Intrexon Energy Partners II Board") and subject to certain limitations. As of March 31, 2020, the Company's remaining commitment was $10,000. Intrexon Energy Partners II is governed by the Intrexon Energy Partners II Board, which has five members. One member of the Intrexon Energy Partners II Board is designated by the Company and four members are designated by a majority of the IEPII Investors. The Company and the IEPII Investors have the right, but not the obligation, to make additional capital contributions above the initial limits when and if solicited by the Intrexon Energy Partners II Board.

The Company's investment in Intrexon Energy Partners II was $(433) and $(435) as of March 31, 2020 and December 31, 2019, respectively, and is included in other accrued liabilities in the accompanying condensed consolidated balance sheets, which represents the Company's equity in losses for contractually committed contributions to Intrexon Energy Partners II.

5. Collaboration and Licensing Revenue

The Company's collaborations and licensing agreements may provide for multiple promises to be satisfied by the Company and typically include a license to the Company's technology platforms, participation in collaboration committees, and performance of certain research and development services. Based on the nature of the promises in the Company's collaboration and licensing agreements, the Company typically combines most of its promises into a single performance obligation because the promises are highly interrelated and not individually distinct. Options to acquire additional services are considered to determine if they constitute material rights. At contract inception, the transaction price is typically the upfront payment received and is allocated to the performance obligations. The Company has determined the transaction price should be recognized as revenue based on its measure of progress under the agreement primarily based on inputs necessary to fulfill the performance obligation.

The Company recognizes the reimbursement payments received for research and development efforts in the period when the services are performed, in connection with the single performance obligation discussed above. The reimbursements relate specifically to the Company's efforts to provide services and the reimbursements are consistent with what the Company would typically charge other collaborators for similar services. The Company assesses the uncertainty of when and if any milestones will be achieved to determine whether the milestone is included in the transaction price. The Company then assesses whether the revenue is constrained based on whether it is probable that a significant reversal of revenue would not occur when the uncertainty is resolved. Royalties, including sales-based milestones, received under the agreements will be recognized as revenue when sales have occurred because the Company applies the sales- or usage-based royalties recognition exception provided for under ASC Topic 606. The Company determined the application of this exception is appropriate because at the

time the royalties are generated, the technology license granted in the agreement is the predominant item to which the royalties relate.

The Company determines whether collaborations and licensing agreements are individually significant for disclosure based on a number of factors, including total revenue recorded by the Company pursuant to collaboration and licensing agreements, collaborators or licensees with equity method investments, or other qualitative factors. Collaboration and licensing revenues generated from consolidated subsidiaries are eliminated in consolidation.

The following table summarizes the amounts recorded as revenue from continuing operations in the condensed consolidated statements of operations for each significant counterparty to a collaboration or licensing agreement for the three months ended March 31, 2020 and 2019.

	Three Months Ended March 31,	
	2020	2019
ZIOPHARM Oncology, Inc.	$ 100	$ 1,166
Oragenics, Inc.	198	201
Intrexon Energy Partners, LLC	—	977
Intrexon Energy Partners II, LLC	—	504
Fibrocell Science, Inc.	10,363	383
Harvest start-up entities (1)	—	2,723
Other	60	17
Total	$ 10,721	$ 5,971

(1) For the three months ended March 31, 2019, revenues recognized from collaborations with Harvest start-up entities include: Thrive Agrobiotics, Inc.; Exotech Bio, Inc.; and AD Skincare, Inc.

Except for the agreements discussed below, there have been no significant changes to the agreements with our collaborators and licensees in the three months ended March 31, 2020.

Fibrocell Science Collaborations

In October 2012, the Company entered into an ECC (the "2012 Fibrocell ECC") with Fibrocell Science, Inc. ("Fibrocell"), a then publicly traded cell and gene therapy company focused on diseases affecting the skin and connective tissue and a related party until the acquisition of Fibrocell by a third party as discussed in Note 17. Pursuant to the 2012 Fibrocell ECC, at the transaction effective date, Fibrocell received a license to the Company's technology platform to develop and commercialize genetically modified and non-genetically modified autologous fibroblasts and autologous dermal cells in the United States of America. The 2012 Fibrocell ECC was subsequently amended in June 2013 to expand the field of use defined in the ECC agreement. In March 2020, the Company and Fibrocell terminated the 2012 Fibrocell ECC by mutual agreement ("Termination Agreement") with the parties agreeing that the two drug product candidates, FCX-007 and FCX-013, pursuant to the ECC would be treated as "Retained Products" under the terms of the 2012 Fibrocell ECC. As Retained Products, Fibrocell retains a license under the 2012 Fibrocell ECC to continue to develop and commercialize the Retained Products within the field of use of the 2012 Fibrocell ECC for so long as Fibrocell continues to pursue such development and commercialization. No further licenses to the Company's technology within the field of use are provided to Fibrocell. Royalty provisions set forth in the 2012 Fibrocell ECC remain in effect for the Retained Products. Additionally, the Termination Agreement provides for the Company to perform certain drug product manufacturing activities related to the Retained Products. The Termination Agreement was accounted for as a new contract and the remaining deferred revenue from the 2012 Fibrocell ECC will be recognized prospectively as the manufacturing activities are performed.

In December 2015, the Company entered into a second ECC with Fibrocell (the "2015 Fibrocell ECC"). Pursuant to the ECC, at the transaction effective date, Fibrocell received a license to the Company's technology platform to develop and commercialize genetically-modified fibroblasts to treat chronic inflammatory and degenerative diseases of the joint, including arthritis and related conditions. In February 2020, the Company and Fibrocell mutually agreed to terminate the 2015 Fibrocell ECC, and accordingly, the Company recognized the remaining balance of deferred revenue associated with the 2015 Fibrocell ECC totaling $10,000.

Deferred Revenue

Deferred revenue primarily consists of consideration received for the Company's collaboration and licensing agreements. Deferred revenue consisted of the following:

	March 31, 2020	December 31, 2019
Collaboration and licensing agreements	$ 40,209	$ 50,593
Prepaid product and service revenues	3,461	2,805
Other	348	435
Total	$ 44,018	$ 53,833
Current portion of deferred revenue	$ 11,141	$ 5,697
Long-term portion of deferred revenue	32,877	48,136
Total	$ 44,018	$ 53,833

Revenue is recognized under the collaboration and licensing agreements as services are performed. Certain of the arrangements are not active while the other party evaluates the status of the project and its desired future development activities. The following table summarizes the remaining balance of deferred revenue associated with upfront and milestone payments for each significant counterparty to a collaboration or licensing agreement as of March 31, 2020 and December 31, 2019, as well as the estimated remaining performance period as of March 31, 2020.

	Average Remaining Performance Period (Years)	March 31, 2020	December 31, 2019
Oragenics, Inc.	4.2	$ 2,823	$ 2,864
Intrexon Energy Partners, LLC	4.0	8,362	8,362
Intrexon Energy Partners II, LLC	4.7	12,843	12,843
Fibrocell Science, Inc.	1.0	7,359	17,697
Harvest start-up entities (1)	4.9	6,993	6,993
Other	2.5	1,829	1,834
Total		$ 40,209	$ 50,593

(1) As of March 31, 2020 and December 31, 2019, the balance of deferred revenue for collaborations with Harvest start-up entities includes: Thrive Agrobiotics, Inc.; Exotech Bio, Inc.; and AD Skincare, Inc.

6. Short-term Investments

The Company's investments are classified as available-for-sale. The following table summarizes the amortized cost, gross unrealized gains and losses, and fair value of available-for-sale investments as of March 31, 2020:

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Aggregate Fair Value
U.S. government debt securities	$ 110,489	$ 579	$ —	$ 111,068
Certificates of deposit	264	—	—	264
Total	$ 110,753	$ 579	$ —	$ 111,332

The following table summarizes the amortized cost, gross unrealized gains and losses, and fair value of available-for-sale investments as of December 31, 2019:

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Aggregate Fair Value
U.S. government debt securities	$ 8,989	$ 7	$ —	$ 8,996
Certificates of deposit	264	—	—	264
Total	$ 9,253	$ 7	$ —	$ 9,260

As of March 31, 2020, all of the available-for-sale investments were due within one year based on their contractual maturities.

Changes in market interest rates and bond yields cause certain investments to fall below their cost basis, resulting in unrealized losses on investments. There were no unrealized losses on the Company's debt security investments as of March 31, 2020.

7. Fair Value Measurements

The carrying amount of cash and cash equivalents, receivables, accounts payable, accrued compensation and benefits, other accrued liabilities, and related party payables approximate fair value due to the short maturity of these instruments.

Assets

The following table presents the placement in the fair value hierarchy of financial assets that are measured at fair value on a recurring basis, including the items for which the fair value option has been elected, as of March 31, 2020:

	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	March 31, 2020
Assets				
U.S. government debt securities	$ —	$ 111,068	$ —	$ 111,068
Other	—	264	—	264
Total	$ —	$ 111,332	$ —	$ 111,332

The following table presents the placement in the fair value hierarchy of financial assets that are measured at fair value on a recurring basis, including the items for which the fair value option has been elected, as of December 31, 2019:

	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	December 31, 2019
Assets				
U.S. government debt securities	$ —	$ 8,996	$ —	$ 8,996
Other	—	264	—	264
Total	$ —	$ 9,260	$ —	$ 9,260

The method used to estimate the fair value of the Level 2 short-term debt investments in the tables above is based on professional pricing sources for identical or comparable instruments, rather than direct observations of quoted prices in active markets.

Liabilities

The carrying values of the Company's long-term debt, excluding the 3.50% convertible senior notes due 2023 (the "Convertible Notes"), approximates fair value due to the length of time to maturity and/or the existence of interest rates that approximate prevailing market rates.

The calculated fair value of the Convertible Notes (Note 11) was approximately $96,000 and $126,000 as of March 31, 2020 and December 31, 2019, respectively, and is based on the recent third-party trades of the instrument as of the balance sheet date. The fair value of the Convertible Notes is classified as Level 2 within the fair value hierarchy as there is not an active market for the Convertible Notes, however, third-party trades of the instrument are considered observable inputs. The Convertible Notes are reflected on the accompanying condensed consolidated balance sheets at amortized cost, which was $160,077 and $157,560 as of March 31, 2020 and December 31, 2019, respectively.

The Company's contingent consideration liabilities are measured on a recurring basis and were $585 at March 31, 2020 and December 31, 2019. These fair value measurements were based on significant inputs not observable in the market and thus represented a Level 3 measurement. A significant change in unobservable inputs could result in a significant impact on the fair value of the Company's contingent consideration liabilities. The contingent consideration liabilities are remeasured to fair value at each reporting date until the contingencies are resolved, and those changes in fair value are recognized in earnings. There were no changes in the fair value of the Level 3 liabilities during the three months ended March 31, 2020.

8. Inventory

Inventory consists of the following:

	March 31, 2020	December 31, 2019
Supplies, embryos and other production materials	$ 2,191	$ 2,282
Work in process	3,965	3,702
Livestock	6,601	7,553
Feed	1,879	2,560
Total inventory	$ 14,636	$ 16,097

9. Property, Plant and Equipment, Net

Property, plant and equipment consist of the following:

	March 31, 2020	December 31, 2019
Land and land improvements	$ 9,814	$ 9,814
Buildings and building improvements	11,765	11,765
Furniture and fixtures	1,385	1,315
Equipment	52,498	54,448
Leasehold improvements	12,839	12,821
Breeding stock	5,576	5,191
Computer hardware and software	9,426	9,434
Construction and other assets in progress	5,382	5,313
	108,685	110,101
Less: Accumulated depreciation and amortization	(49,058)	(49,132)
Property, plant and equipment, net	$ 59,627	$ 60,969

Depreciation expense was $2,931 and $3,178 for the three months ended March 31, 2020 and 2019, respectively.

10. Goodwill and Intangible Assets, Net

The changes in the carrying amount of goodwill for the three months ended March 31, 2020 are as follows:

Balance at December 31, 2019	$ 63,754
Foreign currency translation adjustments	(51)
Balance at March 31, 2020	$ 63,703

The Company had $43,643 of cumulative impairment losses as of March 31, 2020 and December 31, 2019.

Intangible assets consist of the following as of March 31, 2020:

	Gross Carrying Amount	Accumulated Amortization	Net
Patents, developed technologies and know-how	$ 89,363	$ (27,793)	$ 61,570
Customer relationships	10,700	(8,658)	2,042
Trademarks	5,900	(4,023)	1,877
Total	$ 105,963	$ (40,474)	$ 65,489

Intangible assets consist of the following as of December 31, 2019:

	Gross Carrying Amount	Accumulated Amortization	Net
Patents, developed technologies and know-how	$ 90,659	$ (26,619)	$ 64,040
Customer relationships	10,700	(8,440)	2,260
Trademarks	5,900	(3,854)	2,046
Total	$ 107,259	$ (38,913)	$ 68,346

Amortization expense was $1,879 and $2,166 for the three months ended March 31, 2020 and 2019, respectively.

11. Lines of Credit and Long-Term Debt

Lines of Credit

Trans Ova had a $5,000 revolving line of credit with First National Bank of Omaha that matured on April 1, 2020. The line of credit bore interest at the greater of 2.95% above the London Interbank Offered Rate or 3.00%, and the actual rate was 4.54% as of March 31, 2020. The line of credit was subsequently renewed through April 1, 2021 and, subsequent to the renewal, bears interest at the greater of the U.S. Prime Rate or 3.00%. As of March 31, 2020, there was an outstanding balance of $1,205. The amount available under the line of credit is based on eligible accounts receivable and inventory up to the maximum principal amount and was $3,725 as of March 31, 2020. The line of credit is collateralized by certain of Trans Ova's assets and contains certain restricted covenants that include maintaining minimum tangible net worth and working capital and maximum allowable annual capital expenditures. Trans Ova was in compliance with these covenants as of March 31, 2020.

Exemplar has a $700 revolving line of credit with American State Bank that matures on October 31, 2020. The line of credit bears interest at 5.50% per annum. As of March 31, 2020, there was no outstanding balance.

Long-Term Debt

Long-term debt consists of the following:

	March 31, 2020	December 31, 2019
Convertible debt	$ 216,523	$ 213,771
Notes payable	3,976	4,089
Other	117	131
Long-term debt	220,616	217,991
Less current portion	31,886	31,670
Long-term debt, less current portion	$ 188,730	$ 186,321

Convertible Debt

Precigen Convertible Notes

In July 2018, Precigen completed a registered underwritten public offering of $200,000 aggregate principal amount of Convertible Notes and issued the Convertible Notes under an indenture (the "Base Indenture") between Precigen and The Bank of New York Mellon Trust Company, N.A., as trustee, as supplemented by the First Supplemental Indenture (together with the Base Indenture, the "Indenture"). Precigen received net proceeds of $193,958 after deducting underwriting discounts and offering expenses of $6,042.

The Convertible Notes are senior unsecured obligations of Precigen and bear interest at a rate of 3.50% per year, payable semiannually in arrears on January 1 and July 1 of each year beginning on January 1, 2019. The Convertible Notes mature on July 1, 2023, unless earlier repurchased or converted. The Convertible Notes are convertible into cash, shares of Precigen's common stock or a combination of cash and shares, at Precigen's election. The initial conversion rate of the Convertible Notes is 58.6622 shares of Precigen common stock per $1,000 principal amount of Convertible Notes (equivalent to an initial conversion price of approximately $17.05 per share of common stock). The conversion rate is subject to adjustment upon the occurrence of certain events, but will not be adjusted for any accrued and unpaid interest. In addition, following certain corporate events that occur prior to the maturity date as defined in the Indenture, Precigen will increase the conversion rate for a holder who elects to convert its Convertible Notes in connection with such a corporate event in certain circumstances. Prior to April 1, 2023, the holders may convert the Convertible Notes at their option only upon the satisfaction of the following circumstances:

- During any calendar quarter commencing after the calendar quarter ended on September 30, 2018, if the last reported sales price of Precigen's common stock for at least 20 trading days (whether or not consecutive) during the last 30 consecutive trading days of the immediately preceding calendar quarter is greater than or equal to 130% of the conversion price on each applicable trading day;

- During the five business day period after any five consecutive trading day period in which the trading price, as defined in the Indenture, for the Convertible Notes is less than 98% of the product of the last reported sales price of Precigen's common stock and the conversion rate for the Convertible Notes on each such trading day; or

- Upon the occurrence of specified corporate events as defined in the Indenture.

None of the above events allowing for conversion prior to April 1, 2023 occurred during the three months ended March 31, 2020. On or after April 1, 2023 until June 30, 2023, holders may convert their Convertible Notes at any time. Precigen may not redeem the Convertible Notes prior to the maturity date.

If Precigen undergoes a fundamental change, as defined in the Indenture, holders of the Convertible Notes may require Precigen to repurchase for cash all or any portion of their Convertible Notes at a fundamental change repurchase price equal to 100% of the principal amount of the Convertible Notes to be repurchased, plus accrued and unpaid interest to, but excluding, the fundamental change repurchase date. The Indenture contains customary events of default, as defined in the agreement, and, if any of the events occur, could require repayment of a portion or all of the Convertible Notes, including accrued and unpaid interest. Additionally, the Indenture provides that Precigen shall not consolidate with or merge with or into, or sell, convey, transfer or lease all or substantially all of its properties and assets to, another entity, unless (i) the surviving entity is organized

under the laws of the United States and such entity expressly assumes all of Precigen's obligations under the Convertible Notes and the Indenture; and (ii) immediately after such transaction, no default or event of default has occurred and is continuing under the Indenture.

The net proceeds received from the issuance of the Convertible Notes were initially allocated between long-term debt, the liability component, in the amount of $143,723, and additional paid-in capital, the equity component, in the amount of $50,235. Additional paid-in capital was further reduced by $13,367 of deferred taxes resulting from the difference between the carrying amount and the tax basis of the Convertible Notes that is created by the equity component, which also resulted in deferred tax benefit recognized from the reversal of valuation allowances on the then current year domestic operating losses in the same amount. As of March 31, 2020, the outstanding principal balance on the Convertible Notes was $200,000 and the carrying value of long-term debt was $160,077. The effective interest rate on the Convertible Notes, including amortization of the long-term debt discount and debt issuance costs, is 11.02%. As of March 31, 2020, the unamortized long-term debt discount and debt issuance costs totaled $39,923.

The components of interest expense related to the Convertible Notes were as follows:

	Three Months Ended March 31,	
	2020	**2019**
Cash interest expense	$ 1,750	$ 1,750
Non-cash interest expense	2,517	2,213
Total interest expense	$ 4,267	$ 3,963

Accrued interest of $1,750 is included in other accrued liabilities on the accompanying condensed consolidated balance sheet as of March 31, 2020.

ActoBio Convertible Notes

In September 2018, ActoBio issued $30,000 of convertible promissory notes (the "ActoBio Notes") to a related party in conjunction with an asset acquisition with Harvest. The ActoBio Notes have a maturity date of September 6, 2020, accrue interest at 3.0% compounded annually ("accrued PIK interest"), are convertible into shares of ActoBio common stock at any time by the holder, and are automatically convertible in shares of ActoBio common stock upon the closing of certain financing events as defined in the ActoBio Notes. If the ActoBio Notes have not been converted to ActoBio common stock by the maturity date, ActoBio can pay the principal and accrued PIK interest in cash or with shares of Precigen common stock at its election. There are no embedded features that are required to be separated from the debt host and accounted for separately, so the ActoBio Notes were recorded at $30,000. Interest expense was $235 and $225 for the three months ended March 31, 2020 and 2019, respectively. As of March 31, 2020, the carrying value of the ActoBio Notes, including accrued interest, was $31,446.

Precigen and PGEN Therapeutics Convertible Note

In December 2018, in conjunction with the Securities Purchase, Assignment and Assumption Agreement with Ares Trading S.A. ("Ares Trading"), Precigen and PGEN Therapeutics jointly and severally issued a $25,000 convertible note (the "Merck Note") to Ares Trading in exchange for cash. The Merck Note has a maturity date of June 28, 2021 and will be converted to Precigen common stock on the first trading day following maturity if not otherwise converted prior to that date. Prior to maturity, Ares Trading may convert the Merck Note, at their election, into (i) Precigen common stock at any time, (ii) Precigen common stock upon the Company's closing of qualified financing as defined in the agreement, (iii) PGEN Therapeutics equity upon PGEN Therapeutics closing a qualified financing as defined in the agreement, and (iv) PGEN Therapeutics common stock upon the closing of a qualified initial public offering ("IPO") of PGEN Therapeutics common stock. There is no stated interest rate on the Merck Note. However, in the event of a conversion upon a qualified IPO, the conversion price will be 90% of the IPO price. In the event Ares Trading elects to convert the Merck Note into PGEN Therapeutics equity, the Merck Note accrues interest at a rate of 5% per year ("PIK interest") and will be converted with the outstanding principal. The Company determined that the potential PIK interest and IPO conversion discount represented embedded derivatives requiring bifurcation from the debt host but had no significant value as of March 31, 2020.

Notes Payable

Trans Ova has a note payable to American State Bank that matures in April 2033 and had an outstanding principal balance of $3,973 as of March 31, 2020. Trans Ova pays monthly installments of $39, which includes interest at 3.95%. The note payable is collateralized by certain of Trans Ova's real estate and non-real estate assets.

Future Maturities

Future maturities of long-term debt are as follows:

2020	$	31,805
2021		25,329
2022		343
2023		200,356
2024		371
2025		385
Thereafter		1,950
Total	$	260,539

12. Income Taxes

Tax provisions for interim periods are calculated using an estimate of actual taxable income or loss for the respective period, rather than estimating the Company's annual effective income tax rate, as the Company is currently unable to reliably estimate its income for the full year. For the three months ended March 31, 2020, the Company had U.S. taxable loss of approximately $79,300. For the three months ended March 31, 2020, the Company recognized $40 of current foreign income tax expense from continuing operations. For the three months ended March 31, 2019, the Company had U.S. taxable loss of approximately $91,600 and recorded no current domestic income tax benefit. For the three months ended March 31, 2019, the Company recognized $14 of current foreign income tax expense from continuing operations. For the three months ended March 31, 2020, the Company recorded no deferred tax benefit from continuing operations. For the three months ended March 31, 2019, the Company recorded deferred tax benefit of $27 from continuing operations. The Company's net deferred tax assets, excluding certain deferred tax liabilities totaling $2,785, are offset by a valuation allowance due to the Company's history of net losses combined with an inability to confirm recovery of the tax benefits of the Company's losses and other net deferred tax assets. In assessing the realizability of deferred tax assets, management considers whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. Management considers the scheduled reversal of deferred tax liabilities, projected future taxable income and tax planning strategies in making this assessment.

As of March 31, 2020, the Company has operating loss carryforwards for U.S. federal income tax purposes of approximately $647,500 available to offset future taxable income, including approximately $394,800 generated after 2017, U.S. capital loss carryforwards of approximately $199,700, and federal and state research and development tax credits of approximately $10,000, prior to consideration of annual limitations that may be imposed under Section 382 of the Internal Revenue Code of 1986, as amended. Carryforwards generated prior to 2018 begin to expire in 2022, and capital loss carryforwards will expire if unutilized by 2024. As of March 31, 2020, the Company's foreign subsidiaries have foreign loss carryforwards of approximately $71,900, most of which do not expire.

13. Shareholders' Equity

Issuances of Precigen Common Stock

Concurrent with entering into the TS Biotechnology Sale on January 1, 2020, the Company also entered into a subscription agreement with TS Biotechnology pursuant to which TS Biotechnology purchased 5,972,696 shares of the Company's common stock for $35,000 on January 31, 2020.

Share Lending Agreement

Concurrently with the offering of the Convertible Notes (Note 11), Precigen entered into a share lending agreement (the "Share Lending Agreement") with J.P. Morgan Securities LLC (the "Share Borrower") pursuant to which Precigen loaned and delivered 7,479,431 shares of its common stock (the "Borrowed Shares") to the Share Borrower. The Share Lending Agreement will terminate, and the Borrowed Shares will be returned to Precigen within five business days of such termination, upon (i) termination by the Share Borrower or (ii) the earliest to occur of (a) October 1, 2023 and (b) the date, if any, on which the Share Lending Agreement is either mutually terminated or terminated by one party upon a default by the other party. The Share Borrower maintains collateral in the form of cash or certain permitted non-cash collateral with a market value at least equal to the market value of the Borrowed Shares as security for the obligation of the Share Borrower to return the Borrowed Shares when required by the terms above. The Borrowed Shares were offered and sold to the public at a price of $13.37 per share under a registered offering (the "Borrowed Shares Offering"). Precigen did not receive any proceeds from the sale of the Borrowed Shares to the public or any lending fees from the Share Lending Agreement. The Share Borrower or its affiliates received all the proceeds from the sale of the Borrowed Shares to the public. Affiliates of Third Security purchased all of the shares of common stock in the Borrowed Shares Offering.

The Share Lending Agreement was entered into at fair value and met the requirements for equity classification. Therefore, the value is netted against the issuance of the Borrowed Shares in additional paid-in capital. Additionally, the Borrowed Shares are not included in the denominator for loss per share attributable to Precigen shareholders unless the Share Borrower defaults on the Share Lending Agreement.

Issuances of AquaBounty Common Stock

In March 2019, AquaBounty completed an underwritten public offering that resulted in net proceeds of $6,611 after deducting discounts, fees, and expenses. See Note 1 for additional discussion of issuances of AquaBounty common stock in April 2019, which resulted in the deconsolidation of AquaBounty.

Components of Accumulated Other Comprehensive Loss

The components of accumulated other comprehensive loss are as follows:

	March 31, 2020	December 31, 2019
Unrealized gain on investments	$ 579	$ 7
Loss on foreign currency translation adjustments	(1,933)	(27,475)
Total accumulated other comprehensive loss	$ (1,354)	$ (27,468)

See Note 3 for further discussion of the release of cumulative losses on foreign currency translation adjustments upon the closing of the TS Biotechnology Sale.

14. Share-Based Payments

The Company measures the fair value of stock options and restricted stock units ("RSUs") issued to employees and nonemployees as of the grant date for recognition of stock-based compensation expense. Stock-based compensation expense for employees and nonemployees is recognized over the requisite service period, which is typically the vesting period. Stock-based compensation costs included in the condensed consolidated statements of operations are presented below:

	Three Months Ended March 31,	
	2020	**2019**
Cost of products	$ 4	$ 8
Cost of services	29	65
Research and development	589	1,341
Selling, general and administrative	5,096	6,834
Discontinued operations	(1,346)	806
Total	$ 4,372	$ 9,054

Precigen Stock Option Plans

In April 2008, Precigen adopted the 2008 Equity Incentive Plan (the "2008 Plan") for employees and nonemployees pursuant to which Precigen's board of directors granted share-based awards, including stock options, to officers, key employees and nonemployees. Upon the effectiveness of the 2013 Omnibus Incentive Plan (the "2013 Plan"), no new awards may be granted under the 2008 Plan. As of March 31, 2020, there were 244,231 stock options outstanding under the 2008 Plan.

Precigen adopted the 2013 Plan for employees and nonemployees pursuant to which Precigen's board of directors may grant share-based awards, including stock options and shares of common stock, to employees, officers, consultants, advisors, and nonemployee directors. The 2013 Plan became effective in August 2013, and as of March 31, 2020, there were 25,000,000 shares authorized for issuance under the 2013 Plan, of which 12,052,124 stock options and 2,891,634 RSUs were outstanding and 3,301,269 shares were available for grant. In March 2020, Precigen's board of directors approved, subject to shareholder approval at Precigen's annual meeting in June 2020, an increase of 2,000,000 shares of common stock to be reserved for issuance under the 2013 Plan.

In April 2019, Precigen adopted the 2019 Incentive Plan for Non-Employee Service Providers (the "2019 Plan"), which became effective upon shareholder approval in June 2019. The 2019 Plan permits the grant of share-based awards, including stock options, restricted stock awards, and RSUs, to non-employee service providers, including board members. As of March 31, 2020, there were 5,000,000 shares authorized for issuance under the 2019 Plan, of which 770,592 stock options and 497,512 RSUs were outstanding and 2,582,279 shares were available for grant.

Stock option activity was as follows:

	Number of Shares	**Weighted Average Exercise Price**	**Weighted Average Remaining Contractual Term (Years)**
Balances at December 31, 2019	9,022,282	$ 21.94	6.10
Granted	5,280,592	10.44	
Forfeited	(641,750)	(18.13)	
Expired	(594,177)	(25.40)	
Balances at March 31, 2020	13,066,947	17.33	7.01
Exercisable at March 31, 2020	6,905,395	21.86	4.92

RSU activity was as follows:

	Number of Restricted Stock Units	Weighted Average Grant Date Fair Value	Weighted Average Remaining Contractual Term (Years)
Balances at December 31, 2019	1,781,982	$ 8.71	1.24
Granted	2,952,917	3.07	
Vested	(1,016,775)	(6.16)	
Forfeited	(328,978)	(8.45)	
Balances at March 31, 2020	3,389,146	4.59	0.69

Precigen currently uses authorized and unissued shares to satisfy share award exercises.

The Company's Executive Chairman ("Executive Chairman"), who previously served as the Company's Chief Executive Officer ("CEO") until January 1, 2020, received a base salary of $200 per month payable in fully-vested shares of Precigen common stock with such shares subject to a three-year lock-up on resale. The monthly number of shares of common stock was calculated based on the closing price on the last trading day of each month through March 2019 and based on the volume weighted average of the price of Precigen common stock over the 30 day period ending on the last calendar day of each month thereafter, and the shares were issued pursuant to the terms of a Restricted Stock Unit Agreement ("RSU Agreement") between Precigen and the Executive Chairman pursuant to the terms of the 2013 Plan. The RSU Agreement expired March 31, 2020. The fair value of the shares issued as compensation for services is included in selling, general, and administrative expenses in the Company's condensed consolidated statements of operations and totaled $454 and $486 for the three months ended March 31, 2020 and 2019, respectively.

15. Operating Leases

The Company leases certain facilities and equipment under operating leases. Leases with a lease term of twelve months or less are considered short term leases and are not recorded on the balance sheet, and expense for these leases is recognized over the term of the lease. The Company's leases have remaining terms of one to ten years, some of which may include options to extend the lease and some of which may include options to terminate the lease within one year. The Company uses judgment to determine whether it is reasonably possible to extend the lease beyond the initial term or terminate before the initial term ends and the length of the possible extension or early termination. The leases are renewable at the option of the Company and do not contain residual value guarantees, covenants, or other restrictions.

The components of lease costs from continuing operations were as follows:

	Three Months Ended March 31,	
	2020	2019
Operating lease costs	$ 1,760	$ 1,841
Short-term lease costs	437	479
Variable lease costs	493	514
Lease costs	$ 2,690	$ 2,834

As of March 31, 2020, maturities of lease liabilities, excluding short-term and variable leases, for continuing operations were as follows:

2020	$ 5,137
2021	7,407
2022	6,957
2023	5,799
2024	5,700
2025	3,410
Thereafter	817
Total	35,227
Present value adjustment	(8,505)
Total	$ 26,722
Current portion of operating lease liabilities	$ 4,308
Long-term portion of operating lease liabilities	22,414
Total	$ 26,722

Other information related to operating leases in continuing operations was as follows:

	March 31, 2020	December 31, 2019
Weighted average remaining lease term (years)	5.02	5.24
Weighted average discount rate	10.97%	10.96%

	Three Months Ended March 31,	
	2020	2019
Supplemental Cash Flows Information		
Cash paid for operating lease liabilities	$ 1,877	$ 1,835
Operating lease right-of-use assets added in exchange for new lease liabilities	25	—

16. Commitments and Contingencies

Contingencies

In March 2012, Trans Ova was named as a defendant in a licensing and patent infringement suit brought by XY, LLC ("XY"), alleging that Trans Ova's sale of semen-sorting products and services breached a 2004 licensing agreement and infringed on XY's patents related to semen sorting. Trans Ova counterclaimed for breach of contract, antitrust, and patent invalidity, and the matter proceeded to a jury trial in the United States District Court for the District of Colorado in January 2016. The jury determined that XY and Trans Ova had each breached the licensing agreement and that Trans Ova had infringed XY's patents. In April 2016, the court issued its post-trial final judgment, awarding $528 in damages to Trans Ova and $6,066 in damages to XY. The order also provided Trans Ova with the ability to continue to practice XY's technology, subject to an ongoing royalty obligation of 12.5% of gross proceeds on Trans Ova's standard sorted semen products, plus a 2% enhancement on those products utilizing "reverse-sorted semen", or semen that is frozen before being sorted. In addition, the court assigned a $5.00 minimum royalty for a straw of sexed semen. Both parties appealed the district court's order. In May 2018, the Court of Appeals for the Federal Circuit denied Trans Ova's appeal of its claims for antitrust, breach of contract and patent invalidity (except as to one patent, for which the Federal Circuit affirmed invalidity in a separate, same-day ruling in a third-party case). The Federal Circuit remanded the district court's calculation of the ongoing royalty and instructed the district court to re-calculate the ongoing royalty in light of post-verdict economic factors. In March 2019, the district court clarified the royalty base and reset the royalty rates consistent with the Federal Circuit's opinion. In an amended final judgment, the district court increased the royalty rate on Trans Ova's standard sorted semen products to 18.75%. For the reverse-sort enhancement, however, it applied a weighted, blended royalty of 12.63% to Trans Ova's entire *in vitro* fertilization ("IVF") service cycle that utilizes reverse-sorted semen. The district court also changed the minimum royalty for a straw of sexed semen to $6.25 for a 2-

million cell straw (prorated appropriately for straws of higher cell counts), and assigned a minimum royalty for a sexed embryo at $6.25 per embryo. The new royalty rates were made retroactive to February 2016 (the end date of the trial).

Since the inception of the 2004 licensing agreement, Trans Ova has remitted payments to XY pursuant to the terms of that agreement, or pursuant to the terms of the district court's April 2016 post-trial order and its March 2019 post-remand order, and has recorded these payments in cost of services in the condensed consolidated statements of operations for the respective periods. For the period from inception of the 2004 licensing agreement through the district court's April 2016 order, aggregate royalty and license payments were $3,170, of which $2,759 had not yet been deposited by XY. In 2016, the Company recorded the expense of $4,228, representing the excess of the net damages awarded to XY, including prejudgment interest, over the liability previously recorded by Trans Ova for uncashed checks previously remitted to XY. In August 2016, Trans Ova deposited the net damages amount, including prejudgment interest, into the district court's registry, to be held until the appeals process was complete and final judgment amounts were determined. After the appeal, the district court subsequently released the funds held in its registry to XY in January 2019. As for post-trial damages, Trans Ova continued to remit payment to XY every quarter based on the original ongoing royalty rates set by the district court, though XY refused to cash those checks.

Under the district court's March 2019 post-remand order clarifying the royalty base and resetting the royalty rates, Trans Ova recalculated royalties owed from February 2016 through the first quarter of 2019, plus applicable pre- and post-judgment interest, and remitted that payment, totaling $5,801, to XY in May 2019. In June 2019, XY deposited the $5,801 into the district court's registry while the parties resolved two separate disputes over the appropriate calculation of royalties. In the first dispute, XY filed a motion claiming over $1,000 in additional back royalties. Trans Ova contested XY's motion. On February 6, 2020, the district court denied XY's motion without prejudice, holding that XY failed to satisfy its obligation under the court's local rules to meaningfully confer with Trans Ova before filing its motion. The district court held that, should XY choose to re-file its motion, it must include a substantial certificate of conferral demonstrating that it seriously and in good faith tried to resolve its disputes with Trans Ova.

In the second dispute, Trans Ova moved for partial relief from judgment after XY's last patent not expressly limited to reverse sorting expired in December 2019. Trans Ova sought an appropriate reduction in its royalty obligation in light of the fact that many of its products and services do not employ reverse sorting, whereas all of XY's remaining non-expired patents are limited to reverse sorting. On May 5, 2020, the court granted Trans Ova's motion in its entirety and issued a second amended final judgment, which substantially reduced Trans Ova's royalty obligation. The court held that, as of December 4, 2019, Trans Ova's royalty obligation on standard sorted semen products terminated. For the reverse-sort enhancement, the court held that, from December 4, 2019 through January 14, 2022, Trans Ova owes a weighted, blended royalty of 3.93% on the entire IVF service cycle. From January 15, 2022 through May 21, 2022, Trans Ova will owe XY a royalty rate of 5% on just the reverse-sort and IVF procedure components of the IVF service cycle, with no royalty being owed on the ovum pick-up and IVF drug components of the cycle. The order is subject to appeal by XY. On May 22, 2022, Trans Ova will cease owing XY any royalty for the litigated patents.

In December 2016, XY filed a complaint for patent infringement, trade secret misappropriation, and various state law claims against Trans Ova in the United States District Court for the Western District of Texas in Waco, Texas. Since the claims in the 2016 complaint directly relate to the parties' other litigation, Trans Ova succeeded in transferring the case to the same Colorado district court that presided over the 2012 litigation. That court subsequently dismissed nine of the complaint's twelve counts, including all five non-patent counts and four patent counts. The court subsequently dismissed a fifth patent count after ruling that the patent was invalid, leaving only two patent counts left in the case. In February 2019, a Wisconsin district court invalidated one of the two remaining patents, which XY had asserted against another competitor. After initially appealing the Wisconsin court's invalidation of its patent, XY subsequently withdrew the appeal. In March 2019, the Colorado district court stayed the two remaining patent counts (including the one later invalidated by the Wisconsin court) and entered final judgment against XY's ten other dismissed counts. The 2016 litigation is administratively closed, pending disposition of XY's appeal to the Federal Circuit, in which XY has appealed the district court's dismissal of four of its patent causes of action. XY did not appeal the dismissal of any of the non-patent causes of action. The Federal Circuit hearing was held on March 5, 2020, and the court's decision remains pending.

Trans Ova shall continue to utilize the technology consistent with the determinations of the court proceedings. Nonetheless, these disputes remain subject to a number of uncertainties, including the outcome of appellate proceedings, the possibility of further claims by XY, and the impact of these matters on Trans Ova's ability to utilize the technology. Trans Ova and the Company could elect to enter into a settlement agreement in order to avoid the further costs and uncertainties of litigation.

In October 2018, the Company received a subpoena from the Division of Enforcement of the SEC informing the Company of a non-public, fact-finding investigation concerning the Company's disclosures regarding its methane bioconversion platform. The Company has produced documents to, and met with, the staff of the SEC and is voluntarily cooperating with the SEC

investigation. In November 2019, the staff of the SEC informed the Company that its investigative work was largely completed. The Company and the staff of the SEC are currently in discussions, and there can be no assurance regarding the ultimate outcome of the investigation.

The Company has previously entered into strategic collaborations, including ECCs and JVs, to fund and develop products enabled by its technologies. These relationships involve complex interests, and the Company's interests may diverge with those of its collaborators, which can occur as a result of operations under those collaborations, business or technological developments, or as the Company transitions away from, or terminates, certain strategic collaborations. The Company has had, and has, disagreements and disputes with certain collaborators and JV partners, including Harvest, the IEP Investors, and the IEPII Investors. While the Company believes it is entitled to payment for work performed per its collaborations and JVs, consistent with its policy for accounting for accounts receivable, the Company has fully reserved the amount of any disputed accounts receivable that remained outstanding as of March 31, 2020. These disagreements and disputes may result in litigation, unfavorable settlements, or concessions by the Company, adverse regulatory action, or management distraction, any of which could harm the Company's business or operations.

The Company may become subject to other claims, assessments, and governmental investigations from time to time in the ordinary course of business. Such matters are subject to many uncertainties and outcomes are not predictable with assurance. The Company accrues liabilities for such matters when it is probable that future expenditures will be made and such expenditures can be reasonably estimated. As of March 31, 2020, the Company does not believe that any such matters, individually or in the aggregate, will have a material adverse effect on the Company's business, financial condition, results of operations, or cash flows.

17. Related Party Transactions

Third Security and Affiliates

The Company's Executive Chairman and a member of the board of directors is also the Senior Managing Director and CEO of Third Security and owns 100% of the equity interests of Third Security. Through December 2019, the Company was party to a Services Agreement ("Services Agreement") with Third Security pursuant to which Third Security provided the Company with certain professional, legal, financial, administrative, and other support services necessary to support the Company and its Executive Chairman. Under the Services Agreement, as consideration for providing these services, Third Security was entitled to a fee paid in the form of fully-vested shares of Precigen common stock that approximated $800 per month. In 2019, the number of shares of common stock was calculated based on the volume weighted average of the closing price of the Company's common stock over the 30-day period ending on the 15th day of the calendar month when the applicable services were provided. For the three months ended March 31, 2019, the Company accrued $2,078 for services rendered pursuant to the Services Agreement, and the shares were issued in the second quarter of 2019.

Following the expiration of the Services Agreement, the Company entered into a new agreement with Third Security under which the Company reimburses Third Security for certain tax-related services performed by Third Security as requested by the Company. The Company also reimburses Third Security for certain out-of-pocket expenses incurred on the Company's behalf. The total expenses incurred by the Company under these arrangements were $38 and $17 for the three months ended March 31, 2020 and 2019, respectively.

See also Note 14 regarding compensation arrangements between the Company and its Executive Chairman.

The Company also subleases certain administrative offices to Third Security. The significant terms of the lease mirror the terms of the Company's lease with the landlord, and the Company recorded sublease income of $22 for the three months ended March 31, 2020 and 2019.

See Notes 1, 3, and 13 regarding additional transactions with affiliates of Third Security.

Transactions with ECC Parties

Collaborators in which the Company holds more than a de minimis equity interest, including interests received as upfront or milestone payments through collaborations, are considered related parties. The Company held Series A Convertible Preferred Stock (the "Convertible Preferred Shares"), a convertible note, common shares of Fibrocell, and warrants to purchase shares of Fibrocell common stock previously acquired through collaborations and other transactions. In December 2019, Fibrocell was acquired by Castle Creek Pharmaceutical Holdings, Inc. ("Castle Creek"), a privately held company focused on developing medicine for rare genetic disorders. As a result, the Company received $1,280 in December 2019 for its shares of Fibrocell

common stock and received a total of $3,311 in January 2020 for the Convertible Preferred Shares and the convertible note, including accrued interest thereon. The $3,311 is included in other receivables on the accompanying condensed consolidated balance sheet as of December 31, 2019. Subsequent to the acquisition by Castle Creek, Fibrocell is no longer a related party.

18. Net Loss per Share

The following table presents the computation of basic and diluted net loss per share:

	Three Months Ended March 31,	
	2020	**2019**
Historical net loss per share:		
Numerator:		
Net loss from continuing operations attributable to Precigen	$ (29,942)	$ (51,473)
Net loss from discontinued operations attributable to Precigen	(26,056)	(9,236)
Net loss attributable to Precigen	$ (55,998)	$ (60,709)
Denominator:		
Weighted average shares outstanding, basic and diluted	160,338,743	152,948,058
Net loss per share:		
Net loss from continuing operations attributable to Precigen per share, basic and diluted	$ (0.19)	$ (0.34)
Net loss from discontinued operations attributable to Precigen per share, basic and diluted	(0.16)	(0.06)
Net loss attributable to Precigen per share, basic and diluted	$ (0.35)	$ (0.40)

The following potentially dilutive securities as of March 31, 2020 and 2019, have been excluded from the above computations of diluted weighted average shares outstanding for the three months then ended as they would have been anti-dilutive:

	March 31,	
	2020	**2019**
Convertible debt	31,614,643	22,025,046
Options	13,066,947	11,705,841
Restricted stock units	3,389,146	2,288,017
Warrants	133,264	133,264
Total	48,204,000	36,152,168

19. Segments

Through March 31, 2019, the Company was a single operating segment. In April 2019, the Company initiated efforts to better deploy resources, realize inherent synergies, and position the Company for growth with a core focus on healthcare and initiated plans to achieve this through various corporate activities ultimately resulting in the closing of the Transactions in January 2020 (Note 3). Beginning in the second quarter of 2019, the Company's CODM assessed the operating performance of and allocated resources for several operating segments using Segment Adjusted EBITDA. Management believes this financial metric is a key indicator of operating results since it excludes noncash revenues and expenses that are not reflective of the underlying business performance of an individual enterprise. The Company defines Segment Adjusted EBITDA as net loss before (i) interest expense, (ii) income tax expense or benefit, (iii) depreciation and amortization, (iv) stock-based compensation expense, (v) adjustments for bonuses paid in equity awards, (vi) loss on impairment of goodwill and other long-lived assets, (vii) equity in net loss of affiliates, and (viii) recognition of previously deferred revenue associated with upfront and milestone payments as well as cash outflows from capital expenditures and investments in affiliates. For the three months ended March 31, 2020, the Company modified the current period definition of Segment Adjusted EBITDA to exclude adjustments recorded to reverse the difference of bonuses accrued as of December 31, 2019 compared to the value of equity awards granted, as the Company determined in March 2020 that those accrued bonuses would be paid through the grant of equity awards instead of cash. Segment Adjusted EBITDA for the three months ended March 31, 2020 was not impacted by this change.

Because the Company uses Segment Adjusted EBITDA as its primary measure of segment performance, it has included this measure in its discussion of segment operating results. The Company has also disclosed revenues from external customers and intersegment revenues for each reportable segment. Corporate expenses are not allocated to the segments and are managed at a consolidated level. The CODM does not use total assets by segment to evaluate segment performance or allocate resources, and accordingly, these amounts are not required to be disclosed. The Company's CODM now regularly reviews disaggregated financial information for each of the Company's operating segments. The Company's segment presentation has been recast to retrospectively reflect the change from one reportable segment to the newly identified reportable segments and also excludes consideration of all of the businesses included in the Transactions (Note 3).

For the three months ended March 31, 2020, the Company's reportable segments were (i) PGEN Therapeutics, (ii) ActoBio, (iii) MBP Titan, (iv) Trans Ova, and (v) the Human Biotherapeutics division. These identified reportable segments met the quantitative thresholds to be reported separately for the three months ended March 31, 2020. See Note 1 for a description of PGEN Therapeutics, ActoBio, MBP Titan, and Trans Ova. The Company's Human Biotherapeutics division is an operating division within Precigen which includes the Company's majority-owned subsidiary, Triple-Gene LLC, and its collaborations with Fibrocell (Note 5). The All Other category as reported below reflects Precigen's other operating segments that do not meet the quantitative thresholds to be reported separately. The Company has also recast 2019 segment information on the same basis as the current presentation.

Information by reportable segment was as follows:

	Three Months Ended March 31, 2020						
	PGEN Therapeutics	ActoBio	MBP Titan	Trans Ova	Human Biotherapeutics	All Other	Total
Revenues from external customers	$ 160	$ 198	$ —	$ 16,785	$ 10,363	$ 2,292	$ 29,798
Intersegment revenues	2,103	—	7	109	—	281	2,500
Total segment revenues	$ 2,263	$ 198	$ 7	$ 16,894	$ 10,363	$ 2,573	$ 32,298
Segment Adjusted EBITDA	$ (6,919)	$ (1,990)	$ (8,764)	$ (1,199)	$ (1,338)	$ 492	$ (19,718)

	Three Months Ended March 31, 2019						
	PGEN Therapeutics	ActoBio	MBP Titan	Trans Ova	Human Biotherapeutics	All Other	Total
Revenues from external customers	$ 1,181	$ 401	$ 1,481	$ 14,934	$ 383	$ 4,097	$ 22,477
Intersegment revenues	2,365	443	—	273	—	13	3,094
Total segment revenues	$ 3,546	$ 844	$ 1,481	$ 15,207	$ 383	$ 4,110	$ 25,571
Segment Adjusted EBITDA	$ (7,369)	$ (2,438)	$ (8,026)	$ (2,226)	$ (223)	$ (1,238)	$ (21,520)

The table below reconciles total segment revenues from reportable segments to total consolidated revenues:

	Three Months Ended March 31,	
	2020	2019
Total segment revenues from reportable segments	$ 29,725	$ 21,461
Other revenues, including from other operating segments	3,214	4,218
Elimination of intersegment revenues	(3,101)	(3,094)
Total consolidated revenues	$ 29,838	$ 22,585

The table below reconciles Segment Adjusted EBITDA for reportable segments to consolidated net loss from continuing operations before income taxes:

	Three Months Ended March 31,	
	2020	2019
Segment Adjusted EBITDA for reportable segments	$ (20,210)	$ (20,282)
All Other Segment Adjusted EBITDA	492	(1,238)
Remove cash paid for capital expenditures and investments in affiliates	2,741	3,512
Add recognition of previously deferred revenue associated with upfront and milestone payments	12,473	4,612
Other expenses:		
Interest expense	(4,592)	(4,305)
Depreciation and amortization	(4,810)	(5,344)
Stock-based compensation expense	(5,718)	(8,248)
Adjustment related to bonuses paid in equity awards	2,833	—
Equity in net loss of affiliates	(351)	(748)
Other	9	—
Unallocated corporate costs	(10,182)	(18,022)
Eliminations	(2,587)	(2,850)
Consolidated net loss from continuing operations before income taxes	$ (29,902)	$ (52,913)

As of March 31, 2020 and December 31, 2019, the Company had $6,182 and $6,724, respectively, of long-lived assets in foreign countries from continuing operations. The Company recognized revenues from continuing operations derived in foreign countries totaling $241 and $532 for the three months ended March 31, 2020 and 2019, respectively.

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following "Management's Discussion and Analysis of Financial Condition and Results of Operations" should be read in conjunction with the unaudited financial information and the notes thereto included in this Quarterly Report on Form 10-Q, or Quarterly Report, and our Annual Report on Form 10-K for the year ended December 31, 2019, or Annual Report.

The following discussion contains forward-looking statements that reflect our plans, estimates, and beliefs. Our actual results could differ materially from those discussed in the forward-looking statements and you are cautioned not to place undue reliance on forward-looking statements. Factors that could cause or contribute to these differences include those discussed below and elsewhere in this Quarterly Report, particularly in "Special Note Regarding Forward-Looking Statements" and "Risk Factors." The forward-looking statements included in this Quarterly Report are made only as of the date hereof.

Overview

We are a dedicated discovery and clinical-stage biopharmaceutical company advancing the next generation of gene and cell therapies with the overall goal of improving outcomes for patients with significant unmet medical needs. We are leveraging our proprietary technology platforms to develop product candidates designed to target urgent and intractable diseases in our core therapeutic areas of immuno-oncology, autoimmune disorders, and infectious diseases. We have developed an extensive pipeline of therapies across multiple indications within these core focus areas.

We believe that our array of technology platforms uniquely position us among other biotechnology companies to advance precision medicine. Precision medicine is the practice of therapeutic product development that takes into account specific genetic variations within populations impacted by a disease to design targeted therapies to improve outcomes for a disease or patient population. Our proprietary and complementary technology platforms provide a strong foundation to realize the core promise of precision medicine by supporting our efforts to *construct* powerful gene programs to drive efficacy, *deliver* these programs through viral, non-viral, and microbe-based approaches to drive lower costs, and *control* gene expression to drive safety. Our therapeutic platforms, including UltraCAR-T, ActoBiotics, and AdenoVerse Immunotherapy, allow us to precisely control the level and physiological location of gene expression and modify biological molecules to control the function and output of living cells to treat underlying disease conditions.

We are actively advancing our lead programs, including: PRGN-3005 and PRGN-3006, which are built on our UltraCAR-T platform; AG019, which is built on our ActoBiotics platform; and INXN-4001, a non-viral triple-effector plasmid DNA, which is built on our UltraVector platform. In addition, the FDA recently cleared the Investigational New Drug, or IND, application to initiate a Phase 1/2 trial to study PRGN-2009 in participants with human papillomavirus-positive, or HPV+, cancers. We also have a robust pipeline of preclinical programs that we are pursuing in order to drive long-term value creation. We exercise discipline in our portfolio management by systematically evaluating data from our preclinical programs in order to make rapid "go" and "no go" decisions. Through this process, we can more effectively allocate resources to programs that we believe show the most promise and advance such programs to clinical trials.

Our Healthcare Subsidiaries

Our healthcare business is operated by our wholly owned subsidiaries PGEN Therapeutics, Inc., or PGEN Therapeutics, Precigen ActoBio, Inc., or ActoBio, and Exemplar Genetics LLC, doing business as Precigen Exemplar, or Exemplar, and also includes our majority ownership interest in Triple-Gene LLC, doing business as Precigen Triple-Gene, or Triple-Gene, as well as equity and royalty interests in therapeutics and therapeutic platforms from companies not controlled by us.

PGEN Therapeutics, Inc.

PGEN Therapeutics (formerly Precigen, Inc.) is a dedicated discovery and clinical stage biopharmaceutical company advancing the next generation of gene and cell therapies using precision technology to target urgent and intractable diseases in immuno-oncology, autoimmune disorders and infectious diseases. PGEN Therapeutics operates as an innovation engine, progressing a preclinical and clinical pipeline of well-differentiated therapies toward clinical proof-of-concept and commercialization.

PGEN Therapeutics is developing therapies primarily built on our UltraCAR-T therapeutics platform and our "off-the-shelf" AdenoVerse Immunotherapy platform. Through our UltraCAR-T therapeutic platform, we are able to precision-engineer UltraCAR-T cells to produce a homogeneous cell product that simultaneously co-expresses antigen-specific chimeric antigen receptor, or CAR, cells, kill switch, and our proprietary membrane-bound interleukin-15, or mbIL15, genes in any genetically modified UltraCAR-T cell. Our decentralized and rapid proprietary manufacturing process allows us to manufacture these UltraCAR-T cells overnight at a medical center's current good manufacturing practices facility and reinfuse the patient the

following day after gene transfer. This process improves upon current approaches to CAR-T manufacturing, which require extensive ex vivo expansion following viral vector transduction to achieve clinically relevant cell numbers that we believe can result in the exhaustion of CAR-T cells prior to their administration, limiting their potential for persistence in patients. Our AdenoVerse Immunotherapy platform utilizes a library of proprietary adenovectors for the efficient gene delivery of therapeutic effectors, immunomodulators, and vaccine antigens. We believe that our proprietary gorilla adenovectors, part of the AdenoVerse technology, have superior performance characteristics as compared to current competition, including standard human adenovirus serotype 5, rare human adenovirus types and other non-human primate adenovirus types.

Our most advanced programs within PGEN Therapeutics include two therapies: PRGN-3005, a first-in-class autologous CAR-T therapy that utilizes our UltraCAR-T platform to simultaneously co-express a CAR targeting the Mucin 16 antigen, mbIL15, and kill switch genes, which is in a Phase 1 clinical trial for the treatment of advanced ovarian cancer; and PRGN-3006, a first-in-class autologous CAR-T therapy that utilizes our UltraCAR-T platform to co-express a CAR to target CD33 (also known as Siglec-3), mbIL15 and a kill switch for better precision and control, which is in a Phase 1/1b clinical trial for the treatment of relapsed or refractory acute myeloid leukemia and higher-risk myelodysplastic syndromes.

We also recently received IND clearance to initiate a Phase 1/2 clinical trial of PRGN-2009 for patients with HPV+ cancers. PRGN-2009 is a first-in-class, "off-the-shelf" investigational immunotherapy utilizing the AdenoVerse platform. PRGN-2009 is designed to activate the immune system to recognize and target HPV+ solid tumors using a gorilla adenovector with a large payload capacity and the ability for repeat injections. The Phase 1 portion of the study will follow a 3+3 dose escalation design to evaluate the safety of PRGN-2009 administered as a monotherapy and to determine the recommended Phase 2 dose. This will then be followed by an evaluation of the safety of the combination of PRGN-2009 at the recommended dose and bintrafusp alfa (M7824), a proprietary investigational bifunctional fusion protein, in patients with recurrent or metastatic HPV-associated cancers. The Phase 2 portion of the study will evaluate PRGN-2009 as a monotherapy or in combination with the bifunctional fusion protein in patients with newly-diagnosed stage II/III HPV16-positive oropharyngeal cancer. We expect to initiate this study in 2020 in collaboration with the National Cancer Institute pursuant to a cooperative research and development arrangement.

In addition to our clinical programs, PGEN Therapeutics has a robust preclinical pipeline that includes UltraCAR-T therapeutics for various cancers, "off-the-shelf" AdenoVerse immunotherapeutics for infectious diseases, an AdenoVerse cytokine therapy for solid tumors, and PRGN-5001, a multifunctional therapeutic for solid tumors.

Precigen ActoBio, Inc.

ActoBio is pioneering a proprietary class of microbe-based biopharmaceuticals that enable expression and local delivery of disease-modifying therapeutics. We refer to these microbe-based biopharmaceuticals as ActoBiotics. Our ActoBiotics platform is a unique delivery platform precisely tailored for specific disease modification via local delivery directly to the relevant tissue. ActoBiotics combine the advantages of highly selective protein-based therapeutic agents with local delivery by the well-characterized and food-grade bacterium *Lactococcus lactis*, or *L. lactis*. ActoBiotics can be delivered orally in a capsule, through an oral rinse or in a topical solution. We believe ActoBiotics have the potential to provide superior safety and efficacy via the sustained release of appropriate quantities of select therapeutic agents as compared to injectable biologics, while reducing the side effects commonly attributed to systemic delivery and corresponding peaks in concentration.

ActoBio, both independently and through a collaboration, has a clinical pipeline and a portfolio of candidates available for clinical development across a number of potential indications. ActoBio's most advanced internal pipeline candidate, AG019, a first-in-class disease modifying antigen-specific immunotherapy for the prevention, delay, or reversal of type 1 diabetes mellitus, or T1D. AG019 is currently in a Phase 1b/2a clinical trial for the treatment of recent onset T1D.

Precigen Triple-Gene

Triple-Gene is a clinical stage gene therapy company focused on developing advanced treatments for complex cardiovascular diseases. Triple-Gene's approach is to develop a holistic treatment for heart failure through improvements in angiogenesis, calcium homeostasis-associated cellular energetics, reductions in inflammatory signals, and the activation/recruitment of stem cells to support heart remodeling. Triple-Gene's most advanced candidate, INXN-4001, a non-viral triple-effector plasmid based on our UltraVector platform designed for constitutive expression of human S100A1, SDF-1a, and VEGF-165 genes to address multiple pathways of heart failure, is currently in a Phase 1 clinical trial.

Precigen Exemplar

Exemplar is committed to enabling the study of life-threatening human diseases through the development of MiniSwine Yucatan miniature pig research models and services, as well as enabling the production of cells and organs in its genetically engineered swine for regenerative medicine applications. Historically, researchers have lacked animal models that faithfully represent human diseases. As a result, a sizeable barrier has blocked progress in the discovery of human disease mechanisms; novel diagnostics, procedures, devices, prevention strategies and therapeutics; and the ability to predict in humans the efficacy of those next-generation procedures, devices, and therapeutics. Exemplar's MiniSwine models are genetically engineered to exhibit a wide variety of human disease states, which provides a more accurate platform to test the efficacy of new medications and devices.

Partnered Programs

We also are engaged in a number of collaborations, pursuant to which our platforms are being used to advance additional product candidates.

FCX-007 and FCX-013 (Castle Creek Pharma)

We have a collaboration with Fibrocell Science, Inc., or Fibrocell, to advance product candidates FCX-007, which initiated a pivotal Phase 3 clinical trial for the treatment of recessive dystrophic epidermolysis bullosa, or RDEB, in July 2019, and FCX-013, which is currently enrolling the Phase 1 portion of its Phase 1/2 clinical trial for the treatment of localized scleroderma. FCX-007 and FCX-013 each have been granted Orphan Drug designation, Rare Pediatric Disease designation and Fast Track designation by the FDA. The FDA has also granted FCX-007 Regenerative Medicine Advanced Therapy designation. Pursuant to the collaboration, we licensed our technology platforms to Fibrocell for use in certain specified fields and in exchange we received and were entitled to certain access fees, milestone payments, royalties, and sublicensing fees related to the development and commercialization FCX-007 and FCX-013. In March 2020, we and Fibrocell terminated the original collaboration agreement by mutual agreement, or the Termination Agreement, with the parties agreeing that only FCX-007 and FCX-013 would be treated as "Retained Products" under the terms of the original agreement. As Retained Products, Fibrocell retains a license to continue to develop and commercialize the Retained Products within the field of use for so long as Fibrocell continues to pursue such development and commercialization, and we are also entitled to certain royalties with respect to the Retained Products. We are also required to perform certain drug product manufacturing activities related to the Retained Products.

AG013 (Oragenics, Inc.)

ActoBio is in collaboration with Oragenics, Inc., or Oragenics, for the continued development and commercialization of AG013 for use in the treatment of oral mucositis in humans through the administration of an effector via genetically modified bacteria. AG013 has been granted fast track designation by the FDA and orphan drug designation by the European Union. AG013, built on the ActoBiotics platform, is a convenient and well-tolerated oral rinsing solution to deliver human Trefoil Factor 1 via genetically modified *L. lactis*. In April 2020, Oragenics announced that early top-line results of the Phase 2 clinical trial of AG013 did not demonstrate statistical significance on the primary endpoint of severe oral mucositis duration when compared to placebo. Oragenics is conducting detailed ongoing analyses to determine if there may be potential efficacy for sub-patient populations.

Our Non-Healthcare Businesses

While our primary focus is in healthcare, we continue to have two non-healthcare businesses: our established bovine genetics company, Trans Ova Genetics, L.C., or Trans Ova, and our methane bioconversion business, MBP Titan, LLC, or MBP Titan.

Trans Ova Genetics, L.C.

Trans Ova is internationally recognized as a provider of industry-leading bovine reproductive technologies. Trans Ova offers bovine embryo transfer technologies, in addition to other advanced reproductive technologies, including in-vitro fertilization, or IVF, sexed-semen, genetic preservation and cloning. Through extensive research programs and applied science, Trans Ova has developed and implemented new technologies that, we believe, have helped to move the science of bovine genetic improvement forward. We and Trans Ova are evaluating the optimal means to utilize these technology assets and Trans Ova's broad customer base and deep industry knowledge to maximize the value of the business.

MBP Titan LLC

MBP Titan is our standalone subsidiary comprising our Methane Bioconversion Platform, or MBP, and our associated technologies, personnel, and facilities. Our MBP is designed to turn natural gas into more valuable and usable energy and chemical products through novel, highly engineered bacteria that utilize specific energy feedstocks. The MBP production method has the potential to transform the generation of drop-in fuels, synthetic rubber, plastic material, and animal feed through less resource intensive and more sustainable approaches than conventional methods.

We previously announced that we are assessing the appropriate next steps with respect to the future of our MBP platform, which could include a financing directly into MBP Titan, or other strategic alternatives. At this time, a financing or other strategic alternative does not appear imminent, and the market uncertainty driven by the COVID-19 pandemic and the current state of the energy sector raise additional challenges for the strategic alternatives we have been pursuing for the MBP platform in the near term. We are currently in the process of suspending MBP Titan operations while we continue to evaluate the appropriate next steps with respect to the future of the MBP platform. We have also terminated or furloughed certain non-essential personnel.

COVID-19 Impact

In March 2020, the World Health Organization declared the novel strain of coronavirus, now known as COVID-19, a pandemic. COVID-19 has and continues to have an extensive impact on the global health and economic environments.

Commencing in the second half of March, our healthcare business began to experience delays to certain of our clinical trials as a result of COVID-19. For example, starting in March, ActoBio temporarily suspended the last cohort of the Phase 1b/2a clinical trial for AG019 as a proactive measure to protect the welfare and safety of patients, caregivers, clinical site staff, our employees, and contractors. Additionally, from April to May 2020, enrollment of new patients in our PRGN-3005 Phase 1 trial was temporarily suspended, due to a mandated hold on certain early and late-stage clinical trials at the Fred Hutchinson Cancer Research Center in Seattle instituted in light of the COVID-19 pandemic. Neither of these delays was related to safety issues in the studies, and recruitment has resumed in our PRGN-3005 trial. At this time, we do not expect that these suspensions will result in a significant overall delay. As previously announced, we continue to expect to announce initial data from the Arm A: Intraperitoneal (IP) infusion portion of the PRGN-3005 trial in the second half of 2020. In addition, barring any further non-study-related delays, we expect to announce interim data for the first cohort of the Phase 1b/2a clinical trial for AG019 in the third quarter of 2020. As the COVID-19 pandemic continues to evolve, we may experience additional delays to our clinical trials, including related to enrollment, site closures, reduced availability of key personnel, or our ability to receive the necessary approvals from the U.S. Food and Drug Administration, or FDA, or other regulatory agencies to advance our programs.

We are also closely monitoring the impact of COVID-19 on other aspects of our business. While Trans Ova and Exemplar have not experienced any significant impacts as a result of COVID-19 at this time, we are unable to reliably quantify or estimate what the future impacts may be. In addition, we have taken certain steps with respect to our operations of MBP Titan as a result of the impacts of the COVID-19 pandemic and other factors. See "Our Non-Healthcare Businesses - MBP Titan LLC" above.

Given the dynamic nature of these circumstances, the full impact of the COVID-19 pandemic on our ongoing business, results of operations, and overall financial performance for the balance of 2020 and beyond cannot be reasonably estimated at this time. For more information regarding the risks associated with COVID-19 and its impact on our business, see "Risk Factors" in Part II - Item 1A.

TS Biotechnology Sale

Historically, we focused on programming biological systems for application across a variety of diverse end markets, including health, food, energy, and environment, but we have also consistently evolved the way in which we apply our synthetic biology technologies and the opportunities on which we have focused. In January 2020, we furthered our plans to enhance our focus on the healthcare industry when we sold a number of our bioengineering assets, or the TS Biotechnology Sale, to TS Biotechnology Holdings, LLC, or TS Biotechnology, a limited liability company managed by Third Security, LLC, or Third Security. Randal J. Kirk, who is the former Chief Executive Officer, or CEO, of Precigen and is currently the Executive Chairman and a member of our board of directors, serves as the Senior Managing Director and CEO of Third Security and owns 100 percent of the equity interests of Third Security. The assets divested in the TS Biotechnology Sale included our domain name dna.com and all of our equity interests in (1) Blue Marble AgBio LLC, a Delaware limited liability company, that we formed to hold our agricultural biotechnology assets, (2) ILH Holdings, Inc., a Delaware corporation, which housed our yeast fermentation technology platform for the biologic production of active pharmaceutical ingredients and other fine chemicals, (3) Intrexon Produce Holdings, Inc., a Delaware corporation, which owned Okanagan Specialty Fruits, Inc., the agricultural company developing non-browning apple without the use of any artificial additives, (4) Intrexon UK Holdings Inc.,

a Delaware corporation, which owned Oxitec, Ltd., the developer of an insect-based biological control system, (5) Oragenics, which is developing antibiotics against infectious disease and, in collaboration with ActoBio, treatments for oral mucositis, and (6) SH Parent, Inc., a Delaware corporation, which held our ownership interests in Surterra Holdings, Inc., a cannabinoid-based wellness company. In addition, in January 2020, in a separate transaction, we sold our interest in EnviroFlight, LLC to Darling Ingredients, Inc., referred to collectively with the TS Biotechnology Sale as the Transactions.

Beginning in the fourth quarter of 2019, we determined that assets, liabilities, and operations sold in the Transactions collectively met the criteria for discontinued operations. As such, the assets, liabilities, and operations related to the Transactions are reclassified and presented as discontinued operations for all periods presented. See "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 3" appearing elsewhere in this Quarterly Report for a discussion of the Transactions and the discontinued operations.

As we continue our efforts to focus our business and generate additional capital, we may be willing to enter into transactions involving one or more of our operating segments and reporting units for which we have goodwill and intangible assets. These efforts could result in our identifying impairment indicators or recording impairment charges in future periods. In addition, market changes and changes in judgments, assumptions and estimates that we have made in assessing the fair value of goodwill could cause us to consider some portion or all of certain assets to become impaired.

Segments

Through March 31, 2019, we were operating as a single operating segment. In April 2019, in our efforts to better deploy resources, realize inherent synergies, and position the Company for growth with a core focus on healthcare, our chief operating decision maker, or CODM, began assessing the operating performance of and allocating our resources for several operating segments using Segment Adjusted EBITDA, as defined below. As of March 31, 2020, our reportable segments were (i) PGEN Therapeutics, (ii) ActoBio, (iii) MBP Titan, (iv) Trans Ova, and (v) the Human Biotherapeutics division, an operating division of Precigen. These identified reportable segments met the quantitative thresholds to be reported separately for the three months ended March 31, 2020.

Corporate expenses, which are not allocated to the segments and are managed at a consolidated level, include costs associated with general and administrative functions, including our finance, accounting, legal, human resources, information technology, corporate communication, and investor relations functions. Corporate expenses exclude interest expense, depreciation and amortization, stock-based compensation expense, and equity in net loss of affiliates and include unrealized and realized gains and losses on our securities portfolio as well as dividend income. See "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 19" appearing elsewhere in this Quarterly Report for a discussion of our reportable segments and Segment Adjusted EBITDA.

Financial overview

We have incurred significant losses since our inception. We anticipate that we may continue to incur significant losses for the foreseeable future, and we may never achieve or maintain profitability. Outside of collaboration and license fee payments and sales of products and services, which vary over time, we have not generated significant revenues, including revenues or royalties from product sales by us or our collaborators. Certain of our consolidated subsidiaries require regulatory approval and/or commercial scale-up before they may commence significant product sales and operating profits. We are closely monitoring the impacts of the COVID-19 pandemic on our business, operations, and financial results, any of which could be significantly impacted by the COVID-19 pandemic. See "COVID-19 Impact" for additional discussion above.

Sources of revenue

Historically, we have derived our collaboration and licensing revenues through agreements with counterparties for the development and commercialization of products enabled by our technologies. Generally, the terms of these collaborations provide that we receive some or all of the following: (i) technology access fees upon signing; (ii) reimbursements of costs incurred by us for our research and development and/or manufacturing efforts related to specific applications provided for in the collaboration; (iii) milestone payments upon the achievement of specified development, regulatory and commercial activities; and (iv) royalties on sales of products arising from the collaboration.

Our technology access fees and milestone payments may be in the form of cash or securities of the collaborator. Our collaborations contain multiple arrangements, and we typically defer revenues from the technology access fees and milestone payments received and recognize such revenues in the future over the anticipated performance period. We are also entitled to sublicensing revenues in those situations where our collaborators choose to license our technologies to other parties.

As we continue to shift our focus on our healthcare business, we may mutually terminate collaboration agreements or we may repurchase rights to the exclusive fields from collaborators, relieving us of any further performance obligations under the agreement. Upon such circumstances or when we determine no further performance obligations are required of us under an agreement, we may recognize any remaining deferred revenue as either collaboration revenue or as a reduction of in-process research and development expense, depending on the circumstances. See "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 5" appearing elsewhere in the Quarterly Report for a discussion of changes to our significant collaborations.

We generate product and service revenues primarily through sales of products or services that are created from technologies developed or owned by us. Our primary current offerings arise from Trans Ova and include sales of advanced reproductive technologies, including our bovine embryo transfer and IVF processes and from genetic preservation and sexed semen processes, and applications of such processes to other livestock, as well as sales of livestock and embryos produced using these processes and used in production. We recognize revenue when control of the promised product is transferred to the customer or when the promised service is completed.

In future periods, in connection with our focus on healthcare, our revenues will primarily depend on our ability to advance and create our own programs and the extent to which we bring products enabled by our technologies to market. Other than for collaboration revenues recognized upon cancellation or modification of a collaboration, we expect our collaboration revenues will continue to decrease in the near term as the number of collaborations to which we are party declines and as we fulfill our obligations under any remaining ECCs. Our revenues will also depend upon our ability to maintain or improve the volume and pricing of Trans Ova's current product and service offerings and to develop and scale up production of new offerings from the various technologies of our subsidiaries. As we focus on our healthcare business, we anticipate that our expenses will increase substantially if, and as, we continue to advance the preclinical and clinical development of our existing product candidates and our research programs. We expect a significant period of time could pass before commercialization of our various product candidates or before the achievement of contractual milestones and the realization of royalties on product candidates commercialized under our collaborations and revenues sufficient to achieve profitability. Accordingly, there can be no assurance as to the timing, magnitude, and predictability of revenues to which we might be entitled.

Cost of products and services

Cost of products and services includes primarily labor and related costs, drugs and supplies used primarily in Trans Ova's embryo transfer and IVF processes, livestock and feed used in production, and facility charges, including rent and depreciation. Fluctuations in the price of livestock and feed have not had a significant impact on our operating margins and no derivative financial instruments are used to mitigate the price risk.

Research and development expenses

We recognize research and development expenses as they are incurred. Our research and development expenses consist primarily of:

- salaries and benefits, including stock-based compensation expense, for personnel in research and development functions;
- fees paid to consultants and contract research organizations who perform research on our behalf and under our direction;
- costs related to laboratory supplies used in our research and development efforts and acquiring, developing, and manufacturing preclinical study and clinical trial materials;
- costs related to certain in-licensed technology rights or reacquired in-process research and development;
- amortization of patents and related technologies acquired in mergers and acquisitions; and
- facility-related expenses, which include direct depreciation costs and unallocated expenses for rent and maintenance of facilities and other operating costs.

We currently have no individually significant research and development projects, and our research and development expenses primarily relate to either the costs incurred to expand or otherwise improve our technologies or the costs incurred to develop our own products and services. The amount of our research and development expenses may be impacted by, among other

things, the number and nature of our own proprietary programs, and the number and size of programs we may support on behalf of an ECC.

We expect that our research and development expenses will increase as we continue to develop our own proprietary programs, including the progression of these programs into preclinical or clinical stages. We believe these increases will likely include increased costs related to the hiring of additional personnel in research and development functions, increased costs paid to consultants and contract research organizations, and increased costs related to laboratory supplies. However, we expect research and development expenses for MBP Titan to decrease as we scale down operations. See "Our Non-Healthcare Businesses - MBP Titan LLC" above.

Research and development expenses may also increase as a result of ongoing research and development operations that we might assume through mergers and acquisitions or in-licensing of technologies.

Selling, general and administrative expenses

Selling, general and administrative, or SG&A, expenses consist primarily of salaries and related costs, including stock-based compensation expense, for employees in executive, operational, finance, information technology, legal, and corporate communications functions. Other significant SG&A expenses include rent and utilities, insurance, accounting, and legal services, and expenses associated with obtaining and maintaining our intellectual property.

SG&A expenses may fluctuate in the future depending on the number and nature of transactions we may undertake with certain of our operations and subsidiaries. These fluctuations could be related to personnel, legal fees, outside consultants, and other professional services.

Other income (expense), net

We historically held equity securities and preferred stock of private and publicly traded companies, including investments received and/or purchased from certain collaborators. These equity securities and preferred stock were recorded at fair value at each reporting date. Unrealized appreciation (depreciation) resulting from fair value adjustments were reported as other income (expense) in the condensed consolidated statements of operations. We accounted for our investments in private companies using either the equity method or the measurement alternative method for equity securities without readily determinable fair values, which represents cost and any adjustments for impairment or observable price changes in certain transactions. In January 2020, as part of the TS Biotechnology Sale, we sold our remaining equity securities and investment in preferred stock, and therefore, no future gains (losses) will be incurred.

Interest expense is expected to increase in future periods due to the noncash amortization of the long-term debt discount and debt issuance costs related to the 3.50% convertible senior notes due 2023, or the Convertible Notes, issued in July 2018.

Interest income consists of interest earned on our cash and cash equivalents and short-term investments and may fluctuate based on amounts invested and current interest rates. Dividend income historically consisted of the monthly preferred stock dividends received from our investments in preferred stock, all of which has been liquidated as of March 31, 2020.

Equity in net income (loss) of affiliates

Equity in net income or loss of affiliates is our pro-rata share of our equity method investments' operating results, adjusted for accretion of basis difference. We account for investments in our JVs and start-up entities backed by Harvest Intrexon Enterprise Fund I, LP, or Harvest, using the equity method of accounting since we have the ability to exercise significant influence, but not control, over the operating activities of these entities.

Segment performance

We use Segment Adjusted EBITDA as our primary measure of segment performance. We define Segment Adjusted EBITDA as net loss before (i) interest expense, (ii) income tax expense or benefit, (iii) depreciation and amortization, (iv) stock-based compensation expense, (v) adjustments for bonuses paid in equity awards, (vi) loss on impairment of goodwill and other long-lived assets, (vii) equity in net loss of affiliates, and (viii) recognition of previously deferred revenue associated with upfront and milestone payments as well as cash outflows from capital expenditures and investments in affiliates. Corporate expenses are not allocated to the segments and are managed at a consolidated level.

Results of operations

Comparison of the three months ended March 31, 2020 and the three months ended March 31, 2019

The following table summarizes our results of operations for the three months ended March 31, 2020 and 2019, together with the changes in those items in dollars and as a percentage:

	Three Months Ended March 31,		Dollar Change	Percent Change
	2020	2019		
	(In thousands)			
Revenues				
Collaboration and licensing revenues (1)	$ 10,721	$ 5,971	$ 4,750	79.6 %
Product revenues	4,961	4,837	124	2.6 %
Service revenues	13,946	11,383	2,563	22.5 %
Other revenues	210	394	(184)	(46.7)%
Total revenues	29,838	22,585	7,253	32.1 %
Operating expenses				
Cost of products	6,089	7,722	(1,633)	(21.1)%
Cost of services	7,536	7,092	444	6.3 %
Research and development	18,891	26,938	(8,047)	(29.9)%
Selling, general and administrative	23,018	31,049	(8,031)	(25.9)%
Total operating expenses	55,534	72,801	(17,267)	(23.7)%
Operating loss	(25,696)	(50,216)	24,520	(48.8)%
Total other expense, net	(3,855)	(1,949)	(1,906)	97.8 %
Equity in loss of affiliates	(351)	(748)	397	(53.1)%
Loss from continuing operations before income taxes	(29,902)	(52,913)	23,011	(43.5)%
Income tax benefit (expense)	(40)	13	(53)	<(200)%
Loss from continuing operations	(29,942)	(52,900)	22,958	(43.4)%
Loss from discontinued operations, net of income taxes (2)	(26,056)	(9,236)	(16,820)	182.1 %
Net loss	(55,998)	(62,136)	6,138	(9.9)%
Net loss attributable to noncontrolling interests	—	1,427	(1,427)	(100.0)%
Net loss attributable to Precigen	$ (55,998)	$ (60,709)	$ 4,711	(7.8)%

(1) Includes $198 and $4,790 from related parties for the three months ended March 31, 2020 and 2019, respectively.

(2) The results of operations in the table above include the operations related to the Transactions, as well as adjustments to those businesses as a result of the Transactions, all of which are included as loss from discontinued operations, net of income taxes. See "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 3" appearing elsewhere in this Quarterly Report.

Collaboration and licensing revenues

The following table shows the collaboration and licensing revenues recognized for the three months ended March 31, 2020 and 2019, together with the changes in those items.

	Three Months Ended March 31,		Dollar Change
	2020	2019	
	(In thousands)		
ZIOPHARM Oncology, Inc.	$ 100	$ 1,166	$ (1,066)
Oragenics, Inc.	198	201	(3)
Intrexon Energy Partners, LLC	—	977	(977)
Intrexon Energy Partners II, LLC	—	504	(504)
Fibrocell Science, Inc.	10,363	383	9,980
Harvest start-up entities (1)	—	2,723	(2,723)
Other	60	17	43
Total	$ 10,721	$ 5,971	$ 4,750

(1) For the three months ended March 31, 2019, revenues recognized from collaborations with Harvest start-up entities include: Thrive Agrobiotics, Inc.; Exotech Bio, Inc.; and AD Skincare, Inc.

Collaboration and licensing revenues increased $4.8 million, or 80%, over the three months ended March 31, 2019 primarily due to the accelerated recognition of previously deferred revenue upon the mutual termination of a collaboration with Fibrocell in February 2020. This increase was partially offset by a decrease in collaboration revenues related to programs that were paused in 2019 while the other parties evaluate the status of the projects and their desired future development activities.

Product revenues and gross margin

Product revenues were comparable to the three months ended March 31, 2019 as expected. Gross margin on products improved in the current period as a result of operational efficiencies and a decrease in the costs of cows.

Service revenues and gross margin

Service revenues increased $2.6 million, or 23%, from the three months ended March 31, 2019. Trans Ova's service revenues and gross margins thereon increased due to an increase in services performed for new and existing customers and the expansion of its commercial dairy business.

Research and development expenses

Research and development expenses decreased $8.0 million, or 30%, from the three months ended March 31, 2019. Salaries, benefits and other personnel costs decreased $2.1 million and contract research organization costs and lab supplies decreased $5.1 million as we narrowed our focus on our primary healthcare programs.

Selling, general and administrative expenses

SG&A expenses decreased $8.0 million, or 26%, from the three months ended March 31, 2019. Salaries, benefits and other personnel costs decreased $4.8 million primarily due to a reduction of corporate employees as we scaled down our corporate functions. Additionally, professional fees decreased $3.6 million primarily due to the expiration of the services agreement with Third Security on December 31, 2019.

Total other expense, net

Total other expense, net, increased $1.9 million, or 98%, over the three months ended March 31, 2019, which is primarily due to a decrease in interest income on cash equivalents and short-term investments and an increase in noncash amortization of the long-term debt discount and debt issuance costs related to the Convertible Notes.

Segment performance

The following table summarizes Segment Adjusted EBITDA, which is our primary measure of segment performance, for the three months ended March 31, 2020 and 2019, for each of our reportable segments and for All Other segments combined, as well as unallocated corporate costs.

	Three Months Ended March 31,		Dollar Change	Percent Change
	2020	2019		
	(In thousands)			
Segment Adjusted EBITDA:				
PGEN Therapeutics	$ (6,919)	$ (7,369)	$ 450	6.1 %
ActoBio	(1,990)	(2,438)	448	18.4 %
MBP Titan	(8,764)	(8,026)	(738)	(9.2)%
Trans Ova	(1,199)	(2,226)	1,027	46.1 %
Human Biotherapeutics	(1,338)	(223)	(1,115)	<(200)%
All Other	492	(1,238)	1,730	139.7 %
Unallocated corporate costs	10,182	18,022	(7,840)	(43.5)%

For a reconciliation of Segment Adjusted EBITDA to net loss before income taxes, see "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 19" appearing elsewhere in this Quarterly Report.

The following table summarizes revenues from external customers for the three months ended March 31, 2020 and 2019, for each of our reportable segments and for All Other segments combined.

	Three Months Ended March 31,		Dollar Change	Percent Change
	2020	2019		
	(In thousands)			
PGEN Therapeutics	$ 160	$ 1,181	$ (1,021)	(86.5)%
ActoBio	198	401	(203)	(50.6)%
MBP Titan	—	1,481	(1,481)	(100.0)%
Trans Ova	16,785	14,934	1,851	12.4 %
Human Biotherapeutics	10,363	383	9,980	>200%
All Other	2,292	4,097	(1,805)	(44.1)%

PGEN Therapeutics

Revenues for PGEN Therapeutics declined from 2019 to 2020 since we had no significant collaborations requiring services in 2020. Segment Adjusted EBITDA was comparable period over period.

ActoBio

Segment Adjusted EBITDA and revenues are comparable period over period.

MBP Titan

Revenues for MBP Titan have decreased as our partnered programs have been paused since the fourth quarter of 2019. Segment Adjusted EBITDA also declined in 2020 since we did not incur costs to support collaborations and we also reduced our workforce during the first quarter of 2020.

Trans Ova

The improvement in both Trans Ova's Segment Adjusted EBITDA and revenues was primarily due to increased services revenue and improved margins thereon as a result of more procedures performed for new and existing customers, including expansion of its commercial dairy business.

Human Biotherapeutics

The increase in Human Biotherapeutics' Segment Revenues was due to the accelerated recognition of previously deferred revenue upon the mutual termination of a collaboration with Fibrocell. Segment Adjusted EBITDA decreased due to termination costs associated with workforce reductions in the first quarter of 2020.

All Other

The Segment Adjusted EBITDA improved period over period as a result of the closure of two reporting units in 2019, as well as an improvement in Exemplar's Segment Adjusted EBITDA due to increased revenues. Revenues in All Other decreased in 2020 as our partnered programs with Harvest start-up entities have been paused since the third quarter of 2019.

Unallocated Corporate Costs

Unallocated corporate costs decreased primarily due to a decrease in salaries, benefits, and other personnel costs as a result of fewer corporate employees in 2020 and a decrease in professional fees primarily as a result of the December 31, 2019 expiration of our services agreement with Third Security.

Liquidity and capital resources

Sources of liquidity

We have incurred losses from operations since our inception, and as of March 31, 2020, we had an accumulated deficit of $1.7 billion. From our inception through March 31, 2020, we have funded our operations principally with proceeds received from private and public equity and debt offerings, cash received from our collaborators, and through product and service sales made directly to customers. As of March 31, 2020, we had cash and cash equivalents of $37.8 million and short-term investments of $111.3 million. Cash in excess of immediate requirements is typically invested primarily in money market funds and U.S. government debt securities in order to maintain liquidity and preserve capital.

We currently generate cash receipts primarily from sales of products and services, reimbursement of research and development services performed by us, and from strategic transactions involving our subsidiaries.

Cash flows

The following table sets forth the significant sources and uses of cash for the periods set forth below:

	Three Months Ended March 31,	
	2020	2019
	(In thousands)	
Net cash provided by (used in):		
Operating activities	$ (27,743)	$ (43,234)
Investing activities	(36,553)	33,592
Financing activities	34,151	6,927
Effect of exchange rate changes on cash, cash equivalents, and restricted cash	(39)	(504)
Net decrease in cash, cash equivalents, and restricted cash	$ (30,184)	$ (3,219)

Cash flows from operating activities:

During the three months ended March 31, 2020, our net loss was $56.0 million, which includes the following significant noncash expenses totaling $40.0 million from both continuing and discontinued operations: (i) $27.0 million of accumulated foreign currency translation losses that were realized upon the closing of the Transactions, (ii) $4.4 million of stock-based compensation expense, (iii) $4.8 million of depreciation and amortization expense, (iv) $2.5 million accretion of debt discount and amortization of deferred financing costs, (v) $0.9 million of shares issued as payment for services, and (vi) $0.4 million of equity in net loss of affiliates. These expenses were partially offset by the recognition of $10.0 million of previously deferred revenue upon the mutual termination of a collaboration agreement with Fibrocell in February 2020.

During the three months ended March 31, 2019, our net loss was $62.1 million, which includes the following significant noncash expenses totaling $20.3 million from both continuing and discontinued operations: (i) $9.1 million of stock-based compensation expense, (ii) $6.6 million of depreciation and amortization expense, (iii) $2.2 million accretion of debt discount and amortization of deferred financing costs, (iv) $1.6 million of equity in net loss of affiliates, and (v) $0.8 million of shares issued as payment for services. Additionally, we had a $1.3 million net increase in our operating assets and liabilities.

Our first quarter 2020 cash outflows from operations decreased $15.5 million from the first quarter of 2019 primarily due to less cash spend as a result of the TS Biotechnology Sale and a reduction in corporate costs.

Cash flows from investing activities:

During the three months ended March 31, 2020, we purchased $101.3 million of investments, net of maturities, primarily using the $64.2 million of proceeds received from the Transactions, net of cash sold, and the private placement discussed below.

During the three months ended March 31, 2019, we received proceeds of $45.0 million from the maturities of investments and we used $11.5 million for purchases of property, plant and equipment.

Cash flows from financing activities:

During the three months ended March 31, 2020, we received $35.0 million proceeds from the sale of our common stock in a private placement to TS Biotechnology.

During the three months ended March 31, 2019, we received $6.6 million in net proceeds from a public financing.

Future capital requirements

We believe our existing liquid assets will enable us to fund our operating expenses and capital requirements for at least the next 12 months. Our future capital requirements will depend on many factors, including:

- progress in our research and development programs, as well as the magnitude of these programs;
- any delays or potential delays to our clinical trials as a result of the COVID-19 pandemic;
- the timing of regulatory approval of our product candidates and those of our collaborations;
- the timing, receipt and amount of any payments received in connection with strategic transactions;
- the timing, receipt, and amount of upfront, milestone, and other payments, if any, from present and future collaborators, if any;
- the timing, receipt, and amount of sales and royalties, if any, from our product candidates;
- the timing and capital requirements to scale up our various product candidates and service offerings and customer acceptance thereof;
- our ability to maintain and establish additional collaborative arrangements and/or new strategic initiatives;
- the resources, time, and cost required for the preparation, filing, prosecution, maintenance, and enforcement of our intellectual property portfolio;
- strategic mergers and acquisitions, if any, including both the upfront acquisition cost as well as the cost to integrate, maintain, and expand the strategic target;
- the costs associated with legal activities, including litigation, arising in the course of our business activities and our ability to prevail in any such legal disputes; and
- the effects, duration, and severity of the ongoing COVID-19 pandemic and the actions we have taken or may take in response, any of which could significantly impact our business, operations, and financial results.

Until such time, if ever, as we can regularly generate positive operating cash flows, we plan to finance our cash needs through a combination of equity offerings, debt financings, government, or other third-party funding, strategic alliances, sales of assets, and licensing arrangements. As the COVID-19 pandemic continues to negatively impact the economy, our future access to capital on favorable terms may be materially impacted. We may not be able to raise sufficient additional funds on terms that are favorable to us, if at all. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interests of our common shareholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our common shareholders. Our current stock price may make it more difficult to pursue equity financings and lead to substantial dilution if the price of our common stock does not increase. Debt financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures, or declaring dividends. If we raise additional funds through strategic transactions, collaborations, or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs, or product candidates, or to grant licenses on terms that may not be favorable to us.

We are subject to a number of risks similar to those of other companies conducting high-risk, early stage research and development of product candidates. Principal among these risks are dependence on key individuals and intellectual property, competition from other products and companies, and the technical risks associated with the successful research, development, and clinical manufacturing of its product candidates. Our success is dependent upon our ability to continue to raise additional capital in order to fund ongoing research and development, obtain regulatory approval of our products, successfully commercialize our products, generate revenue, meet our obligations, and, ultimately, attain profitable operations. Our ability to achieve what is necessary for our success may be negatively impacted by the uncertainty caused by the COVID-19 pandemic.

Contractual obligations and commitments

The following table summarizes our significant contractual obligations and commitments as of March 31, 2020 and the effects such obligations are expected to have on our liquidity and cash flows in future periods:

	Total	Less Than 1 Year	1 - 3 Years	3 - 5 Years	More Than 5 Years
			(In thousands)		
Operating leases	$ 35,227	$ 7,052	$ 13,985	$ 11,250	$ 2,940
Convertible debt (1)	256,446	31,446	25,000	200,000	—
Cash interest payable on convertible debt	24,500	7,000	14,000	3,500	—
Long-term debt, excluding convertible debt	4,093	441	678	734	2,240
Contingent consideration	585	585	—	—	—
Total	$ 320,851	$ 46,524	$ 53,663	$ 215,484	$ 5,180

(1) Of the $256.4 million convertible debt, $200.0 million may be converted into Precigen common stock and $56.4 million maybe be converted into either Precigen common stock or the common stock of certain of our subsidiaries. See "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 11" appearing elsewhere in this Quarterly Report for further discussion of these instruments.

In addition to the obligations in the table above, as of March 31, 2020 we also have the following significant contractual obligations described below.

In conjunction with the formation of our JVs, we committed to making future capital contributions subject to certain conditions and limitations. As of March 31, 2020, our remaining capital contribution commitments to our JVs were $14.2 million. These future capital contributions are not included in the table above due to the uncertainty of the timing and amounts of such contributions.

We are party to in-licensed research and development agreements with various academic and commercial institutions where we could be required to make future payments for annual maintenance fees as well as for milestones and royalties we might receive upon commercial sales of products that incorporate their technologies. These agreements are generally subject to

termination by us and therefore no amounts are included in the tables above. As of March 31, 2020, we also had research and development commitments with third parties totaling $15.0 million that had not yet been incurred.

Net operating losses

As of March 31, 2020, we had net operating loss carryforwards of approximately $647.5 million for U.S. federal income tax purposes available to offset future taxable income, including $394.8 million generated after 2017, U.S. capital loss carryforwards of $199.7 million, and U.S. federal and state research and development tax credits of approximately $10.0 million, prior to consideration of annual limitations that may be imposed under Section 382 of the Internal Revenue Code of 1986, as amended, or Section 382. Net operating loss carryforwards generated prior to 2018 begin to expire in 2022 and capital loss carryforwards will expire if unutilized by 2024. Our foreign subsidiaries included in continuing operations have foreign loss carryforwards of approximately $71.9 million, most of which do not expire. Excluding certain deferred tax liabilities totaling $2.8 million, our remaining net deferred tax assets, which primarily relate to these loss carryforwards, are offset by a valuation allowance due to our history of net losses.

As a result of our past issuances of stock, as well as due to prior mergers and acquisitions, certain of our net operating losses have been subject to limitations pursuant to Section 382. As of March 31, 2020, Precigen has utilized all net operating losses subject to Section 382 limitations, other than those losses inherited via acquisitions. As of March 31, 2020, approximately $42.1 million of domestic net operating losses were inherited via acquisitions and are limited based on the value of the target at the time of the transaction. Future changes in stock ownership may also trigger an ownership change and, consequently, a Section 382 limitation.

Off-balance sheet arrangements

We did not have during the periods presented, and we do not currently have, any off-balance sheet arrangements as defined under Securities and Exchange Commission, or SEC, rules.

Critical accounting policies and estimates

Our management's discussion and analysis of our financial condition and results of operations is based on our condensed consolidated financial statements, which we have prepared in accordance with generally accepted accounting principles in the United States. The preparation of these condensed consolidated financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements, as well as the reported revenues and expenses during the reporting periods. We evaluate these estimates and judgments on an ongoing basis. We base our estimates on historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Our actual results may differ from these estimates under different assumptions or conditions.

There have been no material changes to our critical accounting policies from those described in "Management's Discussion and Analysis of Financial Condition and Results of Operations" included in our Annual Report.

Recent accounting pronouncements

For information with respect to recent accounting pronouncements and the impact of these pronouncements on our condensed consolidated financial statements, see "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 2" appearing elsewhere in this Quarterly Report.

Item 3. Quantitative and Qualitative Disclosures About Market Risk

The following sections provide quantitative information on our exposure to interest rate risk, stock price risk, and foreign currency exchange risk. We make use of sensitivity analyses that are inherently limited in estimating actual losses in fair value that can occur from changes in market conditions.

Interest rate risk

We had cash, cash equivalents and short-term investments of $149.2 million and $75.1 million as of March 31, 2020 and December 31, 2019, respectively. Our cash and cash equivalents and short-term investments consist of cash, money market funds, U.S. government debt securities, and certificates of deposit. The primary objectives of our investment activities are to

preserve principal, maintain liquidity, and maximize income without significantly increasing risk. Our investments consist of U.S. government debt securities and certificates of deposit, which may be subject to market risk due to changes in prevailing interest rates that may cause the fair values of our investments to fluctuate. We believe that a hypothetical 100 basis point increase in interest rates would not materially affect the fair value of our interest-sensitive financial instruments and any such losses would only be realized if we sold the investments prior to maturity.

Foreign currency exchange risk

We have international subsidiaries in a number of countries, including Belgium and Germany. These subsidiaries' assets, liabilities, and current revenues and expenses are denominated in their respective foreign currency. We do not hedge our foreign currency exchange rate risk. The effect of a hypothetical 10 percent change in foreign currency exchange rates applicable to our business would not have a material impact on our condensed consolidated financial statements.

Item 4. Controls and Procedures

Pursuant to Rule 13a-15(b) under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), we carried out an evaluation, under supervision and with the participation of our management, including our Chief Executive Officer ("CEO"), who is our principal executive officer, and our Chief Financial Officer ("CFO"), who is our principal financial officer, of the effectiveness of the design and operation of our disclosure controls and procedures (as defined under Rule 13a-15(e) and 15d-15(e) under the Exchange Act) as of the end of the period covered by this report. Based upon that evaluation, as of the end of the period covered by this report, our CEO and CFO concluded that our disclosure controls and procedures are effective to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act, is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including our CEO and CFO, as appropriate, to allow timely decisions regarding required disclosure.

There has been no change in our internal control over financial reporting during the three months ended March 31, 2020, that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting. As a result of the COVID-19 pandemic, certain employees of the Company began working remotely in March 2020, but these changes to the working environment did not have a material effect on the Company's internal control over financial reporting.

PART II. OTHER INFORMATION

Item 1. Legal Proceedings

We may become subject to other claims, assessments, and governmental investigations from time to time in the ordinary course of business. Such matters are subject to many uncertainties and outcomes are not predictable with assurance. We accrue liabilities for such matters when it is probable that future expenditures will be made and such expenditures can be reasonably estimated. As of March 31, 2020, we do not believe that any such matters, individually or in the aggregate, will have a material adverse effect on our business, financial condition, results of operations, or cash flows.

Item 1A. Risk Factors

As disclosed in "Item 1A. Risk Factors" in our Annual Report, there are a number of risks and uncertainties that may have a material effect on the operating results of our business and our financial condition. There are no additional material updates or changes to our risk factors since the filing of our Annual Report, except as follows:

The ongoing COVID-19 pandemic could cause a disruption of the development of our product candidates and adversely impact our healthcare business.

In March 2020, the World Health Organization declared the novel strain of coronavirus, now known as COVID-19, a pandemic and federal and state governments began to implement social distancing guidelines and stay-at-home orders. In response to the COVID-19 pandemic, ActoBio took the initiative to temporarily suspend the last remaining cohort of the Phase1b/ 2a trial for AG019, which is the combination of AG019 plus teplizumab in patients 12 to 17 years of age, as a proactive measure to protect the welfare and safety of patients, caregivers, clinical site staff, and our employees and contractors. Further, from April to May 2020, enrollment of new patients in our PRGN-3005 Phase 1 trial was temporarily suspended, due to a mandated hold on certain early and late-stage clinical trials at the Fred Hutchinson Cancer Research Center in Seattle instituted in light of the COVID-19 pandemic. As the COVID-19 pandemic continues to evolve, we expect to continue to experience delays in the development of our product candidates, including as a result of declines in new patient enrollment for new and existing trials, ability to recruit and retain principal investigators and site staff who, as healthcare providers, may have heightened exposure to COVID-19 if an outbreak occurs in their geography, site closures, reduced availability of other key personnel, availability of supplies, or for other reasons that may be difficult to anticipate. For example, we recently received IND clearance to initiate a Phase 1/2 trial to study PRGN-2009 in participants with HPV+ cancers, but our ability to initiate such trial may be delayed or impeded by any of the foregoing factors as a result of the COVID-19 pandemic. In addition, the FDA or other regulatory authorities may have their resources diverted to responding to, or otherwise may be disrupted by, the COVID-19 pandemic, which could result in delays of reviews, approvals and communications with regulatory authorities related to our clinical trials and product candidates. As the focus of our business is on healthcare, disruptions to our clinical trials could result in increased costs, delays in advancing product candidates, or ultimately termination of clinical trials altogether resulting in a material adverse impact to our overall business. Furthermore, a failure to achieve meaningful clinical trial results, or even progress toward those results, could have a material adverse effect on the value of our securities and our ability to secure needed additional capital.

The effects of the COVID-19 pandemic has disrupted, and will likely continue to disrupt, our business operations, which could have a material adverse effect on our results of operations, cash flows, and financial position.

We are closely monitoring the impacts of COVID-19 on all aspects of our business. The operations of our businesses may be adversely impacted by COVID-19, including, for example, if we are unable to secure necessary supplies, including personal protection equipment for our employees. We also rely on third parties for various aspects of our business, including developing some of our product candidates. These third parties may experience similar disruptions or negative impacts to their businesses due to COVID-19, which may result in additional delays or otherwise adversely impact our operations.

While our established bovine genetics company, Trans Ova, experienced a strong first quarter, the significant disruptions from COVID-19 and its cascading effects could mean that the business may be materially adversely affected in the future, including by a decrease in sales or overall demand for our products, the inability of our customers to pay for our services and products, similar negative effects on our suppliers, and disruptions to the global supply chain generally. There have already been a number of initial reports regarding such disruptions to the beef and dairy industry as a result of the COVID-19 pandemic, which impact both Trans Ova's potential customers and its sources of certain resources, such as embryos. Exemplar, our subsidiary that develops MiniSwine models to enable the study of life-threatening diseases, could face similar types of

challenges, including its customers delaying or refusing shipments because of delays in their research and development operations similar to, or more severe than, the challenges and risks we face with our operations.

In addition to the potential impacts to our operations, we have initiated several precautions to mitigate the spread of the illness across our businesses, which may impact our ability to carry out our business as usual, including additional sanitation and cleaning procedures in our laboratories and other facilities, instituting remote working when possible, and implementing social distancing and staggered worktime requirements for our employees that must work on-site. The increase in remote working may also result in elevated susceptibility to cyber security risks. We have incurred additional costs as a result of these measures and will likely continue to do so as a result of these and any future measures necessary to ensure the safety of our employees and the continuity of our operations. These measures could also lead to reduced efficiency in our operations.

Several of our subsidiaries are leanly staffed and rely on key personnel to manage operations. The loss of our key scientific staff, personnel, or other key employees as a result of illness or otherwise, could negatively impact our business and operations, particularly if we are unable to adequately find or train replacements. Certain of our subsidiaries, such as Trans Ova and Exemplar, that operate in industries in which remote working is not possible may be particularly at risk.

Given the dynamic nature of these circumstances, the full impact of the COVID-19 pandemic on our ongoing business, results of operations, and overall financial performance for the balance of 2020 and beyond cannot be reasonably estimated at this time, and it could have a material adverse effect on our results of operations, cash flows, and financial position, including resulting in impairments to goodwill, long-lived assets, and additional credit losses.

The future of our MBP platform is uncertain, and the impacts of the COVID-19 pandemic may create additional challenges in the future with respect to MBP's operations and related opportunities.

We previously announced that we are assessing the appropriate next steps with respect to the future of our MBP platform, which could include a financing directly into MBP Titan or other strategic alternatives. At this time, a financing or other strategic alternative does not appear imminent, and the market uncertainty driven by the COVID-19 pandemic and the current state of the energy sector raise additional challenges for the strategic alternatives we have been pursuing for the MBP platform in the near term. We are currently in the process of suspending MBP Titan operations while we continue to evaluate the appropriate next steps with respect to the future of the MBP platform. As a result of the current situation and the actions we have taken, we will continue to incur costs associated with the MBP platform, but we have placed on hold the developmental advancement of the underlying technology. It may be more difficult in the future to raise funds for the MBP platform or pursue strategic alternatives, and we may lose value that we have created in the MBP platform and incur an impairment to goodwill.

The COVID-19 pandemic has created significant volatility, uncertainty, and economic disruption that could have an adverse effect on the Company's access to capital on favorable terms.

Our operations have consumed substantial amounts of cash since our inception. We expect to continue to spend substantial amounts to continue the preclinical and clinical development of our current and future programs. We are and will continue to be dependent on public or private financings, new collaborations or licensing arrangements with strategic partners, or additional debt financing sources to fund continuing operations. As the COVID-19 pandemic continues to negatively impact the economy, our future access to capital on favorable terms may be materially impacted. We may not be able to raise sufficient additional funds on terms that are favorable to us, if at all. Given the rapid evolution of the COVID-19 pandemic and the uncertainty surrounding it, its impact to our financial condition, including but not limited to, possible impairment, restructuring, and other changes, cannot be reliably quantified or estimated.

In evaluating our risks, readers also should carefully consider the risk factors discussed in our Annual Report, which could materially affect our business, financial condition or operating results, in addition to the other information set forth in this report and in our other filings with the SEC.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds

None.

Item 3. Defaults on Senior Securities

None.

Item 4. Mine Safety Disclosures

Not applicable.

Item 5. Other Information

None.

Item 6. Exhibits

Exhibit No.	Description
10.1†	Amendment to the Amended and Restated 2013 Omnibus Incentive Plan of the Company, as amended, effective as of January 5, 2020.
31.1	Certification of Helen Sabzevari, Chief Executive Officer (Principal Executive Officer) of the Company, pursuant to Rules 13a-14(a) and 15d-14(a) promulgated under the Securities Exchange Act of 1934, as amended, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of Rick L. Sterling, Chief Financial Officer (Principal Financial Officer) of the Company, pursuant to Rules 13a-14(a) and 15d-14(a) promulgated under the Securities Exchange Act of 1934, as amended, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1**	Certification of Helen Sabzevari, Chief Executive Officer (Principal Executive Officer) of the Company, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2**	Certification of Rick L. Sterling, Chief Financial Officer (Principal Financial Officer) of the Company, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.0	Interactive Data File (Quarterly Report on Form 10-Q, for the quarterly period ended March 31, 2020, formatted in Inline XBRL (eXtensible Business Reporting Language)). Attached as Exhibit 101.0 to this Quarterly Report on Form 10-Q are the following documents formatted in XBRL: (i) the Condensed Consolidated Balance Sheets as of March 31, 2020 and December 31, 2019, (ii) the Condensed Consolidated Statements of Operations for the three months ended March 31, 2020 and 2019, (iii) the Condensed Consolidated Statements of Comprehensive Loss for the three months ended March 31, 2020 and 2019, (iv) the Condensed Consolidated Statements of Shareholders' and Total Equity for the three months ended March 31, 2020 and 2019, (v) the Condensed Consolidated Statements of Cash Flows for the three months ended March 31, 2020 and 2019, and (vi) the Notes to the Condensed Consolidated Financial Statements.
104**	Cover Page Interactive Data File (embedded within the Inline XBRL document).

** Furnished herewith.
† Indicates management contract or compensatory plan.

SIGNATURES

Pursuant to the requirements 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.

Precigen, Inc.
(Registrant)

Date: May 11, 2020

By: /s/ Rick L. Sterling
Rick L. Sterling
Chief Financial Officer
(Principal Financial and Accounting Officer)

Exhibit 10.1

AMENDMENT
TO THE
INTREXON CORPORATION
AMENDED AND RESTATED
2013 OMNIBUS INCENTIVE PLAN

The Intrexon Corporation Amended and Restated 2013 Omnibus Incentive Plan, as amended (the "**2013 Plan**"), is hereby amended, effective as of January 5, 2020, as follows:

1. The first sentence of Section 6.03 of the 2013 Plan is hereby deleted and replaced in its entirety with the following:

   > The maximum number of shares of Common Stock that may be covered by Options, SARs or Other Stock-Based Awards in the nature of purchase rights granted to any one Participant during any calendar year shall be 5,000,000 shares of Common Stock; provided, however, that (i) if the Options, SARs or Other Stock-Based Awards in the nature of purchase rights are denominated in shares of Common Stock but an equivalent amount of cash is delivered in lieu of delivery of shares of Common Stock, the foregoing limit shall be applied based on the methodology used by the Committee to convert the number of shares of Common Stock into cash and (ii) any adjustment in the number of shares of Common Stock or amount of cash delivered to reflect actual or deemed investment experience shall be disregarded.

2. Except as amended above, the 2013 Plan shall remain in full force and effect.

Exhibit 31.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Helen Sabzevari, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Precigen, 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 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 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: May 11, 2020

/s/ HELEN SABZEVARI

Helen Sabzevari

Chief Executive Officer

(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Rick L. Sterling, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Precigen, 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 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 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: May 11, 2020

/s/ RICK L. STERLING

Rick L. Sterling

Chief Financial Officer

(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

I, Helen Sabzevari, Chief Executive Officer of Precigen, Inc. (the "Company"), do hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of my knowledge:

- the Quarterly Report on Form 10-Q of the Company for the quarter ended March 31, 2020 (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

- the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: May 11, 2020

/s/ HELEN SABZEVARI
Helen Sabzevari
Chief Executive Officer
(Principal Executive Officer)

A signed original of this written statement required by Section 906, or other document authenticating, acknowledging or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

This certification accompanies the Form 10-Q to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of the Registrant under the Securities Act of 1933 or the Securities Exchange Act of 1934 (whether made before or after the date of the Form 10-Q), irrespective of any general incorporation language contained in such filing.

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

I, Rick L. Sterling, Chief Financial Officer of Precigen, Inc. (the "Company"), do hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of my knowledge:

- the Quarterly Report on Form 10-Q of the Company for the quarter ended March 31, 2020 (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

- the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: May 11, 2020

/s/ RICK L. STERLING

Rick L. Sterling
Chief Financial Officer
(Principal Financial Officer)

A signed original of this written statement required by Section 906, or other document authenticating, acknowledging or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

This certification accompanies the Form 10-Q to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of the Registrant under the Securities Act of 1933 or the Securities Exchange Act of 1934 (whether made before or after the date of the Form 10-Q), irrespective of any general incorporation language contained in such filing.