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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, 2021

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)

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, 2021, 206,414,135 shares of common stock, no par value per share, were issued and outstanding.

PRECIGEN, INC.

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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", "positioned", "potential", "predict", "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 statements may relate to, among other things: (i) the impact of the COVID-19 pandemic on our clinical trials, businesses, operating results, cash flows, and/or financial condition; (ii) the timeliness of regulatory approvals; (iii) our strategy and overall approach to our business model, our efforts to realign our business, and our ability to exercise more control and ownership over the development process and commercialization path; (iv) our ability to successfully enter new markets or develop additional product candidates, including the expected timing and results of investigational studies and preclinical and clinical trials, including any delays or potential delays as a result of the COVID-19 pandemic, whether with our collaborators or independently; (v) our ability to consistently manufacture our product candidates on a timely basis or to establish agreements with third-party manufacturers; (vi) our ability to successfully enter into optimal strategic relationships with our subsidiaries and operating companies that we may form in the future; (vii) our ability to hold or generate significant operating capital, including through partnering, asset sales, and operating cost reductions; (viii) actual or anticipated variations in our operating results; (ix) actual or anticipated fluctuations in competitors' or collaborators' operating results or changes in their respective growth rates; (x) our cash position; (xi) market conditions in our industry; (xii) the volatility of our stock price; (xiii) the ability, and the ability of our collaborators, to protect our intellectual property and other proprietary rights and technologies; (xiv) our ability, and the ability of our collaborators, to adapt to changes in laws or regulations or policies, including federal, state, and local government responses to the COVID-19 pandemic; (xv) outcomes of pending and future litigation; (xvi) the rate and degree of market acceptance of any products developed by us, our subsidiaries, collaborations, or joint ventures, or JVs, and competition from existing technologies and products or new technologies and products that may emerge; (xvii) our ability to retain and recruit key personnel; (xviii) expectations related to the use of proceeds from public offerings and other financing efforts; (xix) estimates regarding expenses, future revenue, capital requirements, and needs for additional financing; and (xx) 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 are based on our beliefs, assumptions, and expectations of our future performance, and 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, 2020, 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, 2021	December 31, 2020
Assets		
Current assets		
Cash and cash equivalents	$ 27,355	$ 51,792
Short-term investments	78,331	48,325
Receivables		
Trade, less allowance for credit losses of $4,762 and $4,825 as of March 31, 2021 and December 31, 2020, respectively	20,790	16,487
Related parties, less allowance for credit losses of $1,509 as of March 31, 2021 and December 31, 2020	12	19
Notes	—	3,689
Other	555	232
Inventory	10,637	11,359
Prepaid expenses and other	6,430	7,192
Current assets held for sale or abandonment	8	9,853
Total current assets	144,118	148,948
Long-term investments	103,610	—
Property, plant and equipment, net	33,716	34,924
Intangible assets, net	61,230	65,396
Goodwill	54,238	54,363
Right-of-use assets	8,639	9,353
Other assets	1,433	1,603
Total assets	$ 406,984	$ 314,587

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, 2021	December 31, 2020
Liabilities and Shareholders' Equity		
Current liabilities		
Accounts payable	$ 4,295	$ 4,598
Accrued compensation and benefits	6,425	8,097
Other accrued liabilities	7,437	9,549
Deferred revenue	3,845	2,800
Current portion of long-term debt	359	360
Current portion of lease liabilities	2,658	2,657
Related party payables	52	19
Current liabilities held for sale or abandonment	172	14,047
Total current liabilities	25,243	42,127
Long-term debt, net of current portion	174,158	171,522
Deferred revenue, net of current portion, including $21,205 from related parties as of March 31, 2021 and December 31, 2020	23,023	23,023
Lease liabilities, net of current portion	6,943	7,744
Deferred tax liabilities	2,722	2,897
Other long-term liabilities	100	100
Total liabilities	232,189	247,413
Commitments and contingencies (Note 16)		
Shareholders' equity		
Common stock, no par value, 400,000,000 shares authorized as of March 31, 2021 and December 31, 2020; 206,414,135 shares and 187,663,207 shares issued and outstanding as of March 31, 2021 and December 31, 2020, respectively	—	—
Additional paid-in capital	2,013,757	1,886,567
Accumulated deficit	(1,840,708)	(1,823,390)
Accumulated other comprehensive income	1,746	3,997
Total shareholders' equity	174,795	67,174
Total liabilities and shareholders' equity	$ 406,984	$ 314,587

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, 2021	Three Months Ended March 31, 2020
Revenues		
Collaboration and licensing revenues, including $0 and $198 from related parties during the three months ended March 31, 2021 and 2020, respectively	$ 66	$ 10,721
Product revenues	6,381	4,961
Service revenues	17,931	13,946
Other revenues	133	210
Total revenues	24,511	29,838
Operating Expenses		
Cost of products	5,574	6,089
Cost of services	7,402	7,536
Research and development	10,521	11,327
Selling, general and administrative	18,702	21,486
Total operating expenses	42,199	46,438
Operating loss	(17,688)	(16,600)
Other Expense, Net		
Interest expense	(4,539)	(4,592)
Interest income	392	673
Other income (expense), net	(58)	64
Total other expense, net	(4,205)	(3,855)
Equity in net loss of affiliates	(3)	(351)
Loss from continuing operations before income taxes	(21,896)	(20,806)
Income tax benefit (expense)	52	(40)
Loss from continuing operations	(21,844)	(20,846)
Income (loss) from discontinued operations, net of income taxes	4,526	(35,152)
Net loss	$ (17,318)	$ (55,998)
Net Loss per Share		
Net loss from continuing operations per share, basic and diluted	$ (0.11)	$ (0.13)
Net income (loss) from discontinued operations per share, basic and diluted	0.02	(0.22)
Net loss per share, basic and diluted	$ (0.09)	$ (0.35)
Weighted average shares outstanding, basic and diluted	193,499,546	160,338,743

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, 2021	2020
Net loss	$ (17,318)	$ (55,998)
Other comprehensive income (loss):		
Unrealized gain (loss) on investments	(48)	572
Loss on foreign currency translation adjustments	(2,203)	(1,415)
Release of cumulative foreign currency translation adjustments to loss from discontinued operations	—	26,957
Comprehensive loss	$ (19,569)	$ (29,884)

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

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

(Amounts in thousands, except share data)	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Other Comprehensive Income	Accumulated Deficit	Total Shareholders' Equity
Balances at December 31, 2020	187,663,207	$ —	$1,886,567	$ 3,997	$(1,823,390)	$ 67,174
Stock-based compensation expense	—	—	5,415	—	—	5,415
Shares issued upon vesting of restricted stock units and for exercises of stock options	1,426,157	—	153	—	—	153
Shares issued as payment for services	74,771	—	577	—	—	577
Shares issued in public offering, net of issuance costs	17,250,000	—	121,045	—	—	121,045
Net loss	—	—	—	—	(17,318)	(17,318)
Other comprehensive loss	—	—	—	(2,251)	—	(2,251)
Balances at March 31, 2021	206,414,135	$ —	$2,013,757	$ 1,746	$(1,840,708)	$ 174,795

(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

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, 2021	2020
Cash flows from operating activities		
Net loss	$ (17,318)	$ (55,998)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	3,523	4,810
(Gain) loss on disposals of assets, net	(343)	217
Gain on sale of discontinued operations	—	(672)
Loss on release of cumulative foreign currency translation adjustments to loss from discontinued operations	—	26,957
Unrealized depreciation on equity securities	—	106
Amortization of premiums (discounts) on investments, net	57	(233)
Equity in net loss of affiliates	3	389
Stock-based compensation expense	5,415	4,372
Shares issued as payment for services	577	930
Provision for credit losses	162	523
Accretion of debt discount and amortization of deferred financing costs	2,751	2,517
Deferred income taxes	(56)	—
Other noncash items	(4,601)	239
Changes in operating assets and liabilities:		
Receivables:		
Trade	(4,949)	438
Related parties	7	25
Other	(279)	1,736
Inventory	721	1,202
Prepaid expenses and other	844	927
Other assets	95	7
Accounts payable	(189)	(917)
Accrued compensation and benefits	(1,893)	(1,941)
Other accrued liabilities	(2,216)	(2,974)
Deferred revenue	1,054	(10,437)
Lease liabilities	218	(53)
Related party payables	33	87
Net cash used in operating activities	(16,384)	(27,743)

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, 2021	2020
Cash flows from investing activities		
Purchases of investments	$ (174,221)	$ (119,267)
Sales and maturities of investments	40,500	18,000
Purchases of property, plant and equipment	(1,014)	(3,152)
Proceeds from sale of assets	1,944	684
Proceeds from sale of discontinued operations, net of cash sold	—	64,240
Proceeds from repayment of notes receivable	3,689	2,942
Net cash used in investing activities	(129,102)	(36,553)
Cash flows from financing activities		
Proceeds from issuance of shares, net of issuance costs	121,045	35,000
Advances from lines of credit	—	8,718
Repayments of advances from lines of credit	—	(9,435)
Payments of long-term debt	(116)	(132)
Proceeds from stock option exercises	111	—
Net cash provided by financing activities	121,040	34,151
Effect of exchange rate changes on cash, cash equivalents, and restricted cash	(11)	(39)
Net decrease in cash, cash equivalents, and restricted cash	(24,457)	(30,184)
Cash, cash equivalents, and restricted cash		
Beginning of period	52,250	68,434
End of period	$ 27,793	$ 38,250
Supplemental disclosure of cash flow information		
Cash paid during the period for interest	$ 3,539	$ 3,568
Cash paid during the period for income taxes	4	40
Significant noncash activities		
Accrued compensation paid in equity awards	$ —	$ 5,100
Purchases of property and equipment included in accounts payable and other accrued liabilities	255	369
Proceeds from sale of assets included in accounts receivable	23	—
Proceeds from stock option exercises included in other receivables	42	—

The following table provides a reconciliation of the cash, cash equivalents, and restricted cash balances as of March 31, 2021 and December 31, 2020 as shown above:

	March 31, 2021	December 31, 2020
Cash and cash equivalents	$ 27,355	$ 51,792
Restricted cash included in other assets	438	458
Cash, cash equivalents, and restricted cash	$ 27,793	$ 52,250

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 cell 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., including its wholly owned subsidiary Progentus, L.C., are providers of reproductive technologies, including services and products sold to cattle breeders and other producers and are hereinafter collectively referred to as "Trans Ova." Trans Ova is a wholly owned subsidiary with primary operations in California, Iowa, Maryland, Missouri, Texas, Washington, and Wisconsin.

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"). MBP Titan's proprietary technology is designed to convert natural gas into more valuable and usable energy and chemical products through novel, highly engineered bacteria that utilize specific energy feedstocks. Prior to October 1, 2019, the operation transferred to MBP Titan was an operating division within Precigen. Beginning in the second quarter of 2020, the Company suspended MBP Titan's operations and began the process to wind down MBP Titan's activities and had substantially completed the wind down by December 31, 2020, with the final disposition of certain property and equipment and the facility operating lease occurring in January 2021. With the exception of certain assets and obligations with which the Company has a continuing involvement after the wind down, MBP Titan has been presented as discontinued operations for all periods presented. See Note 3 for further discussion.

On January 31, 2020, Precigen completed the sale of the majority of its non-healthcare assets and operations to an affiliate of Third Security, LLC ("Third Security"), a related party, which are presented as discontinued operations for the three months ended March 31, 2020. 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, 2021 and results of operations and cash flows for the interim periods ended March 31, 2021 and 2020. 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, 2021, 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, 2020.

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

Liquidity

Management believes that existing liquid assets as of March 31, 2021 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. 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, 2021, the Company incurred a net loss of $17,318 and, as of March 31, 2021, had an accumulated deficit of $1,840,708. 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 functions, obtain regulatory approval of its product candidates, successfully commercialize its product candidates, generate revenue, meet its obligations and, ultimately, attain profitable operations.

Risks and Uncertainties

COVID-19 has had and continues to have an extensive impact on the global health and economic environments.

Commencing in the second half of March 2020, 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 2020, the Company 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, its employees, and contractors. The temporary suspension of the AG019 trial was voluntary and was not related to any patient safety issues in the study. The voluntary suspension of the AG019 trial was lifted in June 2020, and recruitment in the study resumed. 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 that was instituted in light of the COVID-19 pandemic. The temporary suspension of the PRGN-3005 trial was not related to safety issues in the studies, and in May 2020, recruitment resumed in the PRGN-3005 Phase 1 trial. Furthermore, there is uncertainty regarding the duration and severity of the ongoing pandemic, and the Company could experience further delays or other pandemic-related events that may adversely impact the Company's clinical as well as preclinical pipeline candidates in the future.

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 in future periods 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 and long-lived assets and additional credit losses.

See Note 3 for further discussion of the impact of COVID-19 on MBP Titan.

Equity Method Investments

The Company accounts for its investments in each of its joint ventures ("JVs") and accounted 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. See additional discussion related to certain of the Company's JVs in Note 4 and additional discussion related to certain of the Harvest start-up entities in Note 16.

Variable Interest Entities

As of March 31, 2021 and December 31, 2020, the Company determined that its JVs 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. As of March 31, 2021 and December 31, 2020, the Company had no risk of loss related to the identified VIEs. See Note 4 for discussion of the Company's future funding commitments for its significant JVs.

Segment Information

The Company's chief operating decision maker ("CODM") regularly reviews disaggregated financial information for various operating segments. Starting in the first quarter of 2021, the financial information regularly reviewed by the CODM was revised and the operating segments, which were determined to be operating and reportable segments, were (i) Biopharmaceuticals, (ii) Exemplar, and (iii) Trans Ova. The legal entities of PGEN Therapeutics and ActoBio, as well as the Company's majority owned subsidiary Triple-Gene LLC and its partnered program with Castle Creek Biosciences, Inc. ("Castle Creek"), represent the Biopharmaceuticals reportable segment as these businesses share resources and the CODM manages these operations as a group. See Note 1 for a description of PGEN Therapeutics, ActoBio, Exemplar, and Trans Ova. 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, gain or loss on disposals of assets, stock-based compensation expense, loss on settlement agreement, and equity in net loss of affiliates. As a result of the revision of the reportable segments, the Company has restated its historical segment presentation to conform to the revised segment determination. 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 December 2019, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes* ("ASU 2019-12"). The provisions of ASU 2019-12 are intended to simplify various aspects related to accounting for income taxes by removing certain exceptions to the general principles in Accounting Standards Codification ("ASC") Topic 740 and clarifying certain aspects of the current guidance to promote consistency among reporting entities. The Company adopted this standard effective January 1, 2021, and there was no material impact to the accompanying consolidated financial statements.

Recently Issued Accounting Pronouncements

In August 2020, the FASB issued ASU 2020-06, *Debt—Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging—Contracts in Entity's Own Equity (Subtopic 815-40)—Accounting for Convertible Instruments and Contracts in an Entity's Own Equity* ("ASU 2020-06"). The provisions of ASU 2020-06 simplify accounting for convertible instruments by removing major separation models required under current U.S. GAAP. Consequently, more convertible debt instruments will be reported as a single liability instrument with no separate accounting for embedded conversion features. ASU 2020-06 removes certain settlement conditions that are required for equity contracts to qualify for the derivative scope exception, which will permit more equity contracts to qualify for the exception. ASU 2020-06 also simplifies the diluted net income per share calculation in certain areas. The amendments in ASU 2020-06 are effective for annual periods beginning after December 15, 2021, and is effective for the Company for the year ending December 31, 2022. The Company is currently evaluating the impact of the new standard on its consolidated financial statements.

3. Discontinued Operations

MBP Titan

As a result of market uncertainty driven by the COVID-19 pandemic and the state of the energy sector raising significant challenges for the strategic alternatives pursued by MBP Titan, beginning in the second quarter of 2020 and throughout the remainder of 2020, the Company suspended MBP Titan's operations, preserved certain of MBP Titan's intellectual property,

terminated all of its personnel, and undertook steps to dispose of its other assets and obligations. The wind down of MBP Titan's activities was substantially completed by December 31, 2020, with the final disposition of certain property and equipment and the facility operating lease occurring in January 2021. This discontinuation of operations represented the continuation of a strategic shift to becoming a primarily healthcare company advancing technologies and products that address complex healthcare challenges that the Company commenced as part of the Transactions defined and discussed below. The assets, liabilities, and expenses related to the discontinued operations of MBP Titan are reclassified and presented as discontinued operations in the accompanying condensed consolidated financial statements for all periods.

The January 2021 sale of property and equipment resulted in a gain on disposal of assets of $464, which is included in income from discontinued operations in the accompanying condensed consolidated statement of operations for the three months ended March 31, 2021. In January 2021, the Company executed termination and recapture agreements with the landlord of the leased facility used in MBP Titan's operations, thereby relieving the Company of all of its obligations related to the facility that were originally due to expire in July 2025. This lease termination resulted in a gain of $4,602, which is included in income from discontinued operations in the accompanying condensed consolidated statement of operations for the three months ended March 31, 2021.

After the wind down of MBP Titan, certain assets and contractual obligations which were previously managed by MBP Titan continue to be managed at the Precigen corporate level. These remaining assets and contractual obligations include the Company's equity interest in and collaboration agreements with Intrexon Energy Partners, LLC ("Intrexon Energy Partners"), and Intrexon Energy Partners II, LLC ("Intrexon Energy Partners II"), including the associated deferred revenue remaining under each collaboration agreement (Notes 4 and 5), as well as the associated intellectual property developed by MBP Titan to date. These assets, liabilities, and related historical revenue and equity losses are included in the Company's operating results from continuing operations in the accompanying condensed consolidated financial statements for all periods presented as a result of the Company's continuing involvement.

The carrying values of the major classes of assets and liabilities included in assets and liabilities held for sale or abandonment related to MBP Titan as of March 31, 2021 and December 31, 2020, are as follows:

	March 31, 2021	December 31, 2020
Assets		
Property, plant and equipment, net	$ —	$ 586
Right-of-use assets	—	9,131
Other assets	8	136
Total assets held for sale or abandonment	$ 8	$ 9,853
Liabilities		
Lease liabilities, current	$ —	$ 1,890
Other current liabilities	172	619
Lease liabilities, net of current portion	—	11,538
Total liabilities held for sale or abandonment	$ 172	$ 14,047

The following table presents the financial results of discontinued operations related to MBP Titan:

	Three Months Ended March 31,	
	2021	2020
Operating (gains) expenses	$ (4,526)	$ 9,096
Operating income (loss)	4,526	(9,096)
Income (loss) before income taxes	4,526	(9,096)
Income (loss) from discontinued operations	$ 4,526	$ (9,096)

The following table presents the significant noncash items, purchases of property, plant and equipment, and proceeds from sales of assets for the discontinued operations related to MBP Titan that are included in the accompanying condensed consolidated statements of cash flows.

	Three Months Ended March 31,	
	2021	2020
Adjustments to reconcile net loss to net cash used in operating activities		
Depreciation and amortization	$ —	$ 1,011
Gain on disposal of assets	(464)	—
Stock-based compensation expense	—	78
Gain on lease termination (1)	(4,602)	—
Cash flows from investing activities		
Purchases of property, plant and equipment	—	(72)
Proceeds from sales of assets	1,083	—

(1) Included in other noncash items on the accompanying condensed consolidated statement of cash flows.

Transactions with TS Biotechnology Holdings, LLC and Darling Ingredients, Inc.

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 non-healthcare 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 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.;
- Intrexon UK Holdings, Inc., the parent company of Oxitec Limited and its subsidiaries, which focused on biological insect solutions;
- ILH Holdings, Inc., a company focused on the production of certain fine chemicals focused primarily on microbial production of therapeutic compounds; and
- Blue Marble AgBio LLC which was formed in January 2020 and included certain agriculture biotechnology assets and operations that were previously an operating division within Precigen.

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 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 following table presents the financial results of discontinued operations related to the Transactions for the three months ended March 31, 2020.

	Three Months Ended March 31, 2020		
	TS Biotechnology Sale	EnviroFlight Sale	Total
Revenues (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)
Income (loss) before income taxes	(26,055)	1	(26,054)
Income tax expense	(2)	—	(2)
Income (loss) from discontinued operations	$ (26,057)	$ 1	$ (26,056)

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

The following table presents the significant noncash items and purchases of property, plant and equipment for the discontinued operations related to the Transactions that are included in the accompanying condensed consolidated statement of cash flows.

	Three Months Ended March 31, 2020
Adjustments to reconcile net loss to net cash used in operating activities	
Gain on sale of discontinued operations	$ (672)
Loss on release of cumulative foreign currency translation adjustment	26,957
Unrealized depreciation on equity securities	106
Equity in net loss of EnviroFlight	38
Stock-based compensation expense	(1,346)
Cash flows from investing activities	
Purchases of property, plant and equipment	(382)

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 EnviroFlight is shown in the following table for the period in which the Company held the equity method investment.

	Three Months Ended March 31, 2020
Revenues	$ 16
Operating expenses	92
Operating loss	(76)
Net loss	$ (76)

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 Sale. 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 Sale 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 results of operations for the three months ended March 31, 2020.

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

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, entered into a Limited Liability Company Agreement that governs the affairs and conduct of business of 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 exclusive channel collaboration ("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, 2021, 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 $(428) and $(425) as of March 31, 2021 and December 31, 2020, 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.

See Note 3 for additional discussion regarding the Company's investment in 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, 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, 2021, 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 $(435) as of March 31, 2021 and December 31, 2020, 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.

See Notes 3 and 16 for additional discussion regarding the Company's investment in Intrexon Energy Partners II.

5. Collaboration and Licensing Revenue

Historically, the Company has derived collaboration and licensing revenue through agreements with counterparties for the development and commercialization of products enabled by the Company's technology platforms. These 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 in the condensed consolidated statements of operations for each significant counterparty to a collaboration or licensing agreement for the three months ended March 31, 2021 and 2020.

	Three Months Ended March 31,	
	2021	2020
ZIOPHARM Oncology, Inc.	$ —	$ 100
Oragenics, Inc.	—	198
Castle Creek Biosciences, Inc.	59	10,363
Other	7	60
Total (1)	$ 66	$ 10,721

(1) Collaboration and licensing revenues recognized for the three months ended March 31, 2021 and 2020, include the recognition of $66 and $10,384, respectively, associated with upfront and milestone payments which were previously deferred.

There have been no significant changes to the agreements with our collaborators and licensees in the three months ended March 31, 2021.

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, 2021	December 31, 2020
Collaboration and licensing agreements	$ 23,354	$ 23,420
Prepaid product and service revenues	3,301	2,126
Other	213	277
Total	$ 26,868	$ 25,823
Current portion of deferred revenue	$ 3,845	$ 2,800
Long-term portion of deferred revenue	23,023	23,023
Total	$ 26,868	$ 25,823

Revenue is recognized under 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, 2021 and December 31, 2020, as well as the estimated remaining performance period as of March 31, 2021.

	Average Remaining Performance Period (Years)	March 31, 2021	December 31, 2020
Intrexon Energy Partners, LLC	3.0	$ 8,362	$ 8,362
Intrexon Energy Partners II, LLC	3.7	12,843	12,843
Castle Creek Biosciences, Inc.	0.8	320	379
Other	2.0	1,829	1,836
Total		$ 23,354	$ 23,420

6. Short-term and Long-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, 2021:

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Aggregate Fair Value
U.S. government debt securities	$ 181,711	$ 1	$ (36)	$ 181,676
Certificates of deposit	265	—	—	265
Total	$ 181,976	$ 1	$ (36)	$ 181,941

The following table summarizes the amortized cost, gross unrealized gains and losses, and fair value of available-for-sale investments as of December 31, 2020:

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Aggregate Fair Value
U.S. government debt securities	$ 48,048	$ 14	$ (1)	$ 48,061
Certificates of deposit	264	—	—	264
Total	$ 48,312	$ 14	$ (1)	$ 48,325

The estimated fair value of available-for-sale investments classified by their contractual maturities as of March 31, 2021 was:

Due within one year	$ 78,331
After one year through three years	103,610
Total	$ 181,941

Changes in market interest rates and bond yields cause certain investments to fall below their cost basis, resulting in unrealized losses on investments. The unrealized losses of the Company's debt security investments are not significant as of March 31, 2021.

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 as of March 31, 2021:

	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	March 31, 2021
Assets				
U.S. government debt securities	$ —	$ 181,676	$ —	$ 181,676
Other	—	265	—	265
Total	$ —	$ 181,941	$ —	$ 181,941

The following table presents the placement in the fair value hierarchy of financial assets that are measured at fair value on a recurring basis as of December 31, 2020:

	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	December 31, 2020
Assets				
U.S. government debt securities	$ —	$ 48,061	$ —	$ 48,061
Other	—	264	—	264
Total	$ —	$ 48,325	$ —	$ 48,325

The method used to estimate the fair value of the Level 2 short-term and long-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 $176,000 and $165,000 as of March 31, 2021 and December 31, 2020, 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 $170,898 and $168,147 as of March 31, 2021 and December 31, 2020, respectively.

8. Inventory

Inventory consists of the following:

	March 31, 2021	December 31, 2020
Supplies, embryos and other production materials	$ 2,085	$ 2,060
Work in process	2,239	2,348
Livestock	4,860	5,047
Feed	1,453	1,904
Total inventory	$ 10,637	$ 11,359

9. Property, Plant and Equipment, Net

Property, plant and equipment consist of the following:

	March 31, 2021	December 31, 2020
Land and land improvements	$ 9,844	$ 9,844
Buildings and building improvements	12,088	12,088
Furniture and fixtures	1,224	1,228
Equipment	31,537	31,150
Leasehold improvements	6,260	6,260
Breeding stock	912	868
Computer hardware and software	5,710	5,684
Construction and other assets in progress	2,530	2,754
	70,105	69,876
Less: Accumulated depreciation and amortization	(36,389)	(34,952)
Property, plant and equipment, net	$ 33,716	$ 34,924

Depreciation expense was $1,593 and $1,920 for the three months ended March 31, 2021 and 2020, respectively.

10. Goodwill and Intangible Assets, Net

The changes in the carrying amount of goodwill for the three months ended March 31, 2021 were as follows:

Balance at December 31, 2020	$ 54,363
Foreign currency translation adjustments	(125)
Balance at March 31, 2021	$ 54,238

The Company had $43,643 of cumulative impairment losses as of March 31, 2021 and December 31, 2020.

Intangible assets consist of the following as of March 31, 2021:

	Gross Carrying Amount	Accumulated Amortization	Net
Patents, developed technologies and know-how	$ 93,691	$ (34,946)	$ 58,745
Customer relationships	10,850	(9,568)	1,282
Trademarks	5,900	(4,697)	1,203
Total	$ 110,441	$ (49,211)	$ 61,230

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

	Gross Carrying Amount	Accumulated Amortization	Net
Patents, developed technologies and know-how	$ 96,927	$ (34,412)	$ 62,515
Customer relationships	10,850	(9,340)	1,510
Trademarks	5,900	(4,529)	1,371
Total	$ 113,677	$ (48,281)	$ 65,396

Amortization expense was $1,930 and $1,879 for the three months ended March 31, 2021 and 2020, respectively.

11. Lines of Credit and Long-Term Debt

Lines of Credit

Trans Ova has a $5,000 revolving line of credit with First National Bank of Omaha that matures on April 1, 2022. The line of credit bears interest at the greater of the U.S. Prime Rate or 3.00%, and the actual rate was 3.25% as of March 31, 2021. As of March 31, 2021, there was no outstanding balance. The amount available under the line of credit is based on eligible accounts receivable and inventory up to the maximum principal amount and was $5,000 as of March 31, 2021. 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.

Exemplar has a $700 revolving line of credit with American State Bank that matures on October 31, 2021. As of March 31, 2021, the line of credit bore interest at 4.00% per annum, and there was no outstanding balance.

Long-Term Debt

Long-term debt consists of the following:

	March 31, 2021	December 31, 2020
Convertible debt	$ 170,898	$ 168,147
Notes payable	3,547	3,655
Other	72	80
Long-term debt	174,517	171,882
Less current portion	359	360
Long-term debt, less current portion	$ 174,158	$ 171,522

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 and are repayable in cash, unless earlier repurchased or converted. Upon conversion by the holders, 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, 2021. 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, 2021, the outstanding principal balance on the Convertible Notes was $200,000 and the carrying value of long-term debt was $170,898. 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, 2021, the unamortized long-term debt discount and debt issuance costs totaled $29,102.

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

	Three Months Ended March 31,	
	2021	2020
Cash interest expense	$ 1,750	$ 1,750
Non-cash interest expense	2,751	2,517
Total interest expense	$ 4,501	$ 4,267

Accrued interest of $1,750 is included in other accrued liabilities on the accompanying condensed consolidated balance sheet as of March 31, 2021.

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, which accrued interest at 3.0% compounded annually ("accrued PIK interest"), matured in September 2020. The Company issued 6,293,402 shares of Precigen common stock upon conversion of the outstanding principal balance and accrued PIK interest at maturity. Interest expense was $235 for the three months ended March 31, 2020.

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. In October 2020, pursuant to the terms of the Merck Note, Ares Trading voluntarily elected to convert the entire $25,000 outstanding into 6,758,400 shares of Precigen common stock.

Notes Payable

Trans Ova has a note payable to American State Bank that matures in April 2033 and had an outstanding principal balance of $3,547 as of March 31, 2021. 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 as of March 31, 2021 are as follows:

2021	$ 272
2022	398
2023	200,361
2024	375
2025	390
2026	406
Thereafter	1,417
Total	$ 203,619

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. The Company has U.S. taxable loss of approximately $40,400 and $79,300 for the three months ended March 31, 2021 and 2020, respectively. The following table presents the components of income tax (benefit) expense from continuing operations.

	Three Months Ended March 31,	
	2021	**2020**
Current foreign income tax expense from continuing operations	$ 4	$ 40
Deferred income tax benefit from continuing operations	(56)	—
Total income tax (benefit) expense from continuing operations	$ (52)	$ 40

The Company's net deferred tax assets, excluding certain deferred tax liabilities totaling $2,722, 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, 2021, the Company has net operating loss carryforwards for U.S. federal income tax purposes of approximately $796,600 available to offset future taxable income, including approximately $543,900 generated after 2017, U.S. capital loss carryforwards of approximately $211,500, and federal and state research and development tax credits of approximately $10,300, prior to consideration of annual limitations that may be imposed under Section 382 of the Internal Revenue Code of 1986, as amended. Net operating loss carryforwards generated prior to 2018 will begin to expire in 2022, and capital loss carryforwards will expire if unutilized beginning in 2024. As of March 31, 2021, the Company's foreign subsidiaries have foreign loss carryforwards of approximately $78,050, most of which do not expire.

13. Shareholders' Equity

Issuances of Precigen Common Stock

In January 2021, the Company closed a public offering of 17,250,000 shares of its common stock, resulting in net proceeds of $121,045 after deducting underwriting discounts and $568 of capitalized offering expenses.

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.

See Notes 11 and 17 for discussion regarding additional issuances of Precigen common stock.

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.

Components of Accumulated Other Comprehensive Income

The components of accumulated other comprehensive income are as follows:

	March 31, 2021	December 31, 2020
Unrealized gain (loss) on investments	$ (35)	$ 13
Income on foreign currency translation adjustments	1,781	3,984
Total accumulated other comprehensive income	$ 1,746	$ 3,997

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,	
	2021	2020
Cost of products	$ 9	$ 4
Cost of services	65	29
Research and development	1,038	535
Selling, general and administrative	4,303	5,072
Discontinued operations	—	(1,268)
Total	$ 5,415	$ 4,372

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, 2021, there were 158,288 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, 2021, there were 27,000,000 shares authorized for issuance under the 2013 Plan, of which 10,227,008 stock options and 574,672 RSUs were outstanding and 6,753,674 shares were available for grant.

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, 2021, there were 5,000,000 shares authorized for issuance under the 2019 Plan, of which 1,066,318 stock options and 215,692 RSUs were outstanding and 1,974,662 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, 2020	11,255,896	$ 15.53	7.25
Granted	228,320	7.74	
Exercised	(26,790)	(5.70)	
Forfeited	(1,726)	(9.98)	
Expired	(4,086)	(26.77)	
Balances at March 31, 2021	11,451,614	15.39	7.17
Exercisable at March 31, 2021	7,462,888	17.43	6.36

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, 2020	1,727,712	$ 6.11	0.42
Granted	462,019	7.87	
Vested	(1,399,367)	(5.47)	
Balances at March 31, 2021	790,364	8.29	0.85

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

The Company's Executive Chairman ("Executive Chairman"), who previously served as an employee and executive officer until September 24, 2020, received a base salary of $200 per month through March 31, 2020, payable in fully-vested shares of Precigen common stock with such shares subject to a three-year lock-up on resale. In September 2020, the Company's board of directors, upon the recommendation of the compensation committee of the board, approved a new compensation arrangement for the Executive Chairman consisting of (i) an annual retainer of $100 payable in cash or, at the Executive Chairman's election, shares of Precigen common stock; (ii) an annual grant of fully vested stock options having a grant date fair value of $250; and (iii) an annual grant of RSUs having a grant date fair value of $250 vesting over one year. The new compensation arrangement began in calendar year 2021 and was prorated for the nine months of 2020 not covered by the Executive Chairman's previous compensation arrangement discussed above. Expense associated with the arrangements above is included in selling, general, and administrative expenses in the Company's condensed consolidated statements of operations and totaled $400 and $454 for the three months ended March 31, 2021 and 2020, 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. All other leases have remaining terms of one to nine 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 were as follows:

	Three Months Ended March 31,	
	2021	2020
Operating lease costs	$ 839	$ 901
Short-term lease costs	506	437
Variable lease costs	230	224
Lease costs	$ 1,575	$ 1,562

As of March 31, 2021, maturities of lease liabilities, excluding short-term and variable leases, for continuing operations were as follows:

2021	$ 2,653
2022	3,358
2023	2,055
2024	1,814
2025	1,076
2026	562
Thereafter	285
Total	11,803
Present value adjustment	(2,202)
Total	$ 9,601
Current portion of operating lease liabilities	$ 2,658
Long-term portion of operating lease liabilities	6,943
Total	$ 9,601

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

	March 31, 2021	December 31, 2020
Weighted average remaining lease term (years)	4.05	4.21
Weighted average discount rate	10.26 %	10.27 %

	Three Months Ended March 31,	
	2021	2020
Supplemental disclosure of cash flow information		
Cash paid for operating lease liabilities	$ 1,005	$ 995
Operating lease right-of-use assets added in exchange for new lease liabilities	55	25

16. Commitments and Contingencies

Contingencies

On December 1, 2020, Trans Ova settled one of two patent infringement lawsuits brought by XY, LLC ("XY"). The lawsuit, originally filed in 2012, was tried and appealed between 2016 and 2020. On December 1, 2020, the parties reached a settlement resolving all remaining disputes. As part of that settlement, Trans Ova remitted to XY a settlement payment, which, in addition to all the other monies Trans Ova had previously paid XY, constituted full payment and satisfaction of the judgment, including pre-judgment interest, post-judgment interest, costs, and all past, current and future royalty obligations under the judgment. In exchange, XY released and forever discharged Trans Ova from all obligations arising out of the judgment. In addition, XY dismissed with prejudice its pending appeal. On January 8, 2021, the parties filed a stipulation of case termination with the district court.

The second patent infringement lawsuit brought on by XY was filed in December 2016. On March 20, 2019, the United States District Court for the District of Colorado entered judgment under Rule 54(b) as to ten of the twelve counts of the operative complaint, dismissed those patent counts from the case, and stayed the remaining two counts of patent infringement pending XY's appeal of the Rule 54(b) judgment. While XY's appeal was pending, one of the two patents remaining in the case was separately invalidated in a different district court proceeding, which XY did not appeal. As to the ten dismissed counts in the suit XY brought against Trans Ova, XY appealed dismissal of only four of them, each alleging patent infringement. On July 31, 2020, the United States Court of Appeals for the Federal Circuit reversed the district court's dismissal of those four patent counts and remanded the case for further proceedings. The Court is assessing next steps of the case, including an amended scheduling order.

While this patent infringement lawsuit is 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 district court and 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 Securities and Exchange Commission ("SEC") informing the Company of a non-public, fact-finding investigation concerning the Company's disclosures regarding its methane bioconversion platform. The Company produced documents to, and met with, the staff of the SEC and voluntarily cooperated with the SEC investigation. In September 2020, the Company reached a final settlement with the SEC regarding the matter. Under the terms of the settlement, the Company, without admitting or denying the allegations of the SEC, consented to the entry of an administrative order requiring that the Company: (i) cease and desist from committing or causing any violations and future violations under Section 13(a) of the Securities Exchange Act of 1934, as amended, and Rules 13a-11 and 12b-20 promulgated thereunder; and (ii) pay a $2,500 civil money penalty to the SEC.

In October 2020, several purported shareholder class action lawsuits were filed in the U.S. District Court for the Northern District of California on behalf of certain purchasers of the Company's common stock. The complaints name as defendants the Company and certain of its current and former officers. The plaintiff's claims track the allegations in the SEC's administrative order described above and assert claims under Sections 10(b) and 20(a) of the Securities Exchange Act of 1934. The plaintiffs seek compensatory damages, interest, and an award of reasonable attorney's fees and costs. In April 2021, the court granted an order consolidating the claims and appointed a lead plaintiff and lead counsel in the case, captioned *Abailla v. Precigen, Inc., F/K/A Intrexon Corp., et al*. In December 2020, a derivative shareholder action, captioned *Edward D. Wright, derivatively on behalf of Precigen, Inc. F/K/A Intrexon Corp. v. Alvarez et al*, was filed in the Circuit Court for Fairfax County in Virginia on behalf of Precigen, Inc. The complaint names as defendants current directors and certain current and former officers. The plaintiff's claims track the allegations in the SEC's administrative order described above and assert claims under state law. The plaintiff seeks damages, forfeiture of benefits received by defendants, and an award of reasonable attorneys' fees and costs. The Company intends to defend the lawsuits vigorously; however, there can be no assurances regarding the ultimate outcome of these lawsuits.

On July 10, 2020, the Company received a notice of arbitration from Harvest pursuant to the Collaboration Investment Opportunity Agreement dated March 13, 2015. In December 2020, the Company entered into an agreement with Harvest to resolve matters related to the parties' contractual and equity relationships and to settle all claims made in connection with the notice of arbitration noted above. Pursuant to the settlement agreement, the Company issued 2,117,264 shares of its common stock to Harvest valued at $18,103 in consideration of (i) the termination of the ECC agreements with Thrive Agrobiotics, Inc., Exotech Bio, Inc., and AD Skincare, Inc., which the Company had $6,993 of deferred revenue remaining related to these ECCs prior to the settlement agreement; (ii) the return of the Company's ownership interest in these Harvest start-up entities that had a total value of $326 prior to the settlement agreement; (iii) the commitment of Harvest to take reasonable commercial efforts to transfer to the Company its membership interests in Intrexon Energy Partners II; and (iv) mutual irrevocable and unconditional releases of claims. The Company wrote off the investment balances and netted the deferred revenue balances associated with the eliminated service obligation against the consideration paid. Outstanding receivables from these Harvest start-up entities related to research and development services performed by the Company under the ECC agreements, which had been fully reserved in 2019, were also forgiven as part of the settlement agreement and written off by the Company. Following the settlement agreement, these Harvest start-up entities are no longer related parties.

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 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, 2021. These disagreements and disputes result in management distraction and may result in litigation, unfavorable settlements, or concessions by the Company, or adverse regulatory action, any of which could harm the Company's business or operations.

In the course of its business, the Company is involved in litigation or legal matters, including governmental investigations. 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, 2021, 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 is also the Senior Managing Director and Chairman of Third Security and owns 100% of the equity interests of Third Security. The Company has an 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 $41 and $38 for the three months ended March 31, 2021 and 2020, 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 $20 and $22 for the three months ended March 31, 2021 and 2020, respectively.

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 Castle Creek, and warrants to purchase shares of Castle Creek common stock previously acquired through collaborations and other transactions. As a result of the acquisition of Castle Creek by Castle Creek Pharmaceutical Holdings, Inc. ("Castle Creek Pharmaceutical") in December 2019, the Company received $1,280 in December 2019 for its shares of Castle Creek 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. Subsequent to the acquisition by Castle Creek Pharmaceutical, Castle Creek is no longer a related party.

18. Net Loss per Share

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

	Three Months Ended March 31,	
	2021	**2020**
Historical net loss per share:		
Numerator:		
Net loss from continuing operations	$ (21,844)	$ (20,846)
Net income (loss) from discontinued operations	4,526	(35,152)
Net loss	$ (17,318)	$ (55,998)
Denominator:		
Weighted average shares outstanding, basic and diluted	193,499,546	160,338,743
Net loss per share:		
Net loss from continuing operations per share, basic and diluted	$ (0.11)	$ (0.13)
Net income (loss) from discontinued operations per share, basic and diluted	0.02	(0.22)
Net loss per share, basic and diluted	$ (0.09)	$ (0.35)

The following potentially dilutive securities as of March 31, 2021 and 2020, 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,	
	2021	2020
Convertible debt	11,732,440	31,614,643
Options	11,451,614	13,066,947
Restricted stock units	790,364	3,389,146
Warrants	133,264	133,264
Total	24,107,682	48,204,000

19. Segments

The Company's CODM assesses the operating performance of and allocates 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 income (loss) before (i) interest expense, (ii) income tax expense or benefit, (iii) depreciation and amortization, (iv) stock-based compensation expense, (v) loss on settlement agreements where noncash consideration is paid, (vi) adjustments for accrued bonuses paid in equity awards, (vii) gain or loss on disposals of assets, (viii) loss on impairment of goodwill and other noncurrent assets, (ix) equity in net loss of affiliates, and (x) recognition of previously deferred revenue associated with upfront and milestone payments as well as cash outflows from capital expenditures and investments in affiliates, but includes proceeds from the sale of assets in the period sold. During the three months ended March 31, 2021, the Company modified the definition of Segment Adjusted EBITDA to exclude the gain or loss on disposals of assets and include proceeds from the sale of assets in the period sold. Segment Adjusted EBITDA for the three months ended March 31, 2020 was restated to reflect 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 segment presentation excludes amounts related to the businesses included in the Transactions and the operations of MBP Titan which are reported as discontinued operations (Note 3).

For the three months ended March 31, 2021, the Company's reportable segments were (i) Biopharmaceuticals, (ii) Exemplar, and (iii) Trans Ova. These identified reportable segments met the quantitative thresholds to be reported separately for the three months ended March 31, 2021. See Note 2 for a description of Biopharmaceuticals. See Note 1 for a description of Exemplar and Trans Ova.

Segment Adjusted EBITDA by reportable segment was as follows:

	Three Months Ended March 31,	
	2021	2020
Biopharmaceuticals	$ (8,854)	$ (10,022)
Exemplar	1,806	250
Trans Ova	6,421	(457)
Segment Adjusted EBITDA for reportable segments	$ (627)	$ (10,229)

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,	
	2021	2020
Segment Adjusted EBITDA for reportable segments	$ (627)	$ (10,229)
Remove cash paid for capital expenditures, net of proceeds from sale of assets, and cash paid for investments in affiliates	597	2,125
Add recognition of previously deferred revenue associated with upfront and milestone payments	307	12,473
Other expenses:		
Interest expense	(4,539)	(4,592)
Depreciation and amortization	(3,523)	(3,799)
Loss on disposals of assets	(121)	(217)
Stock-based compensation expense	(5,415)	(5,640)
Adjustment related to accrued bonuses paid in equity awards	—	2,833
Equity in net loss of affiliates	(3)	(351)
Other	(7)	9
Unallocated corporate costs	(8,194)	(10,838)
Eliminations	(371)	(2,580)
Consolidated net loss from continuing operations before income taxes	$ (21,896)	$ (20,806)

Revenues by reportable segment were as follows:

	Three Months Ended March 31, 2021			
	Biopharmaceuticals	Exemplar	Trans Ova	Total
Revenues from external customers	$ 178	$ 3,257	$ 21,076	$ 24,511
Intersegment revenues	241	—	107	348
Total segment revenues	$ 419	$ 3,257	$ 21,183	$ 24,859

	Three Months Ended March 31, 2020			
	Biopharmaceuticals	Exemplar	Trans Ova	Total
Revenues from external customers	$ 10,862	$ 2,151	$ 16,785	$ 29,798
Intersegment revenues	2,089	—	109	2,198
Total segment revenues	$ 12,951	$ 2,151	$ 16,894	$ 31,996

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

	Three Months Ended March 31,	
	2021	2020
Total segment revenues from reportable segments	$ 24,859	$ 31,996
Other revenues	—	41
Elimination of intersegment revenues	(348)	(2,199)
Total consolidated revenues	$ 24,511	$ 29,838

As of March 31, 2021 and December 31, 2020, the Company had $5,407 and $5,908, respectively, of long-lived assets in foreign countries. The Company recognized revenues derived in foreign countries totaling $99 and $241 for the three months ended March 31, 2021 and 2020, 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, 2020, or Annual Report.

The following discussion contains forward-looking statements that reflect our plans, estimates, expectations, 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 positions 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, AdenoVerse immunotherapy, and ActoBiotics, are designed to 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 clinical programs, including: PRGN-3005 and PRGN-3006, which are built on our UltraCAR-T platform; PRGN-2009 and PRGN-2012, which are based on our AdenoVerse immunotherapy platform; and AG019, which is built on our ActoBiotics platform. In addition, we recently completed a Phase 1 study of INXN-4001, a non-viral triple-effector plasmid DNA, which is built on our UltraVector platform. We also have a robust pipeline of preclinical programs that we are pursuing in order to drive long-term value creation.

We have developed a proprietary electroporation device, UltraPorator, designed to further streamline and ensure the rapid and cost-effective manufacturing of UltraCAR-T therapies. In October 2020, we announced that UltraPorator received U.S. Food and Drug Administration, or FDA, clearance for manufacturing UltraCAR-T cells in clinical trials, and in November 2020, we announced that we have begun dosing patients with UltraCAR-T cells manufactured with UltraPorator in our PRGN-3005 and PRGN-3006 clinical trials.

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 believe we can more effectively allocate resources to programs that we believe show the most promise and advance such programs to clinical trials.

Our Healthcare Business

Our healthcare business focuses on human therapeutics and developing research models and services for healthcare research applications. Our Biopharmaceuticals segment is operated by our wholly owned subsidiaries PGEN Therapeutics, Inc., or PGEN Therapeutics, and Precigen ActoBio, Inc., or ActoBio, and 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. Exemplar Genetics LLC, doing business as Precigen Exemplar, or Exemplar, is a wholly owned subsidiary which is focused on developing research models and services for healthcare research applications.

Biopharmaceuticals

PGEN Therapeutics

PGEN Therapeutics 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 therapeutics platform, we are able to precision-engineer UltraCAR-T cells to produce a homogeneous cell product that simultaneously expresses antigen-specific chimeric antigen receptor, or CAR, 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 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. We have developed a proprietary electroporation device, UltraPorator, designed to further streamline and ensure the rapid and cost-effective manufacturing of UltraCAR-T therapies. The UltraPorator system includes proprietary hardware and software solutions and potentially represents major advancements over current electroporation devices by significantly reducing the processing time and contamination risk. UltraPorator is intended to be a viable scale-up and commercialization solution for decentralized UltraCAR-T manufacturing. Our AdenoVerse immunotherapy platform utilizes a library of proprietary adenovectors for the efficient gene delivery of therapeutic effectors, immunomodulators, and vaccine antigens. We have established proprietary manufacturing cell lines and production methodologies from our AdenoVerse immunotherapy platform, which we believe are easily scalable for commercial supply. 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 are as follows:

PRGN-3005 is a first-in-class, investigational autologous CAR-T therapy that utilizes our UltraCAR-T platform to simultaneously express a CAR targeting the unshed portion of the Mucin 16 antigen, mbIL15, and kill switch genes. PRGN-3005 is currently being evaluated in a Phase 1/1b clinical trial for the treatment of advanced, recurrent platinum-resistant ovarian cancer, fallopian tube or primary peritoneal cancer. A dose escalation phase of the intraperitoneal (IP) arm of the PRGN-3005 Phase 1 trial is ongoing, and an expansion phase is planned at the maximum tolerated dose, or MTD. A dose escalation phase of the intravenous (IV) arm of the PRGN-3005 trial is ongoing concurrently with the IP arm.

PRGN-3006 is a first-in-class, investigational autologous CAR-T therapy that utilizes our UltraCAR-T platform to express a CAR to target CD33 (Siglec-3), mbIL15 and kill switch genes. PRGN-3006 is currently being evaluated in an investigator-initiated Phase 1/1b clinical trial for the treatment of relapsed or refractory acute myeloid leukemia, or AML, higher-risk myelodysplastic syndromes, or MDS, and chronic myelomonocytic leukemia, or CMML. A dose escalation phase of each of the non-lymphodepletion and the lymphodepletion arms of this Phase 1 trial is ongoing concurrently. The dose escalation phase of each arm is planned to be followed by an expansion phase at the MTD. PRGN-3006 was granted Orphan Drug designation for the treatment of AML by the FDA.

PRGN-2009 is a first-in-class, "off-the-shelf" investigational immunotherapy designed to activate the immune system to recognize and target human papillomavirus-positive, or HPV+, solid tumors. PRGN-2009 leverages our UltraVector and AdenoVerse platforms to optimize HPV type 16 and HPV type 18, antigen design for delivery via a proprietary gorilla adenovector with a large genetic payload capacity and the ability for repeat administrations. PRGN-2009 is in a Phase 1/2 clinical trial as a monotherapy or in combination with bintrafusp alfa, or M7824, an investigational bifunctional fusion protein, for patients with HPV-associated cancers in collaboration with the National Cancer Institute, or NCI, pursuant to a cooperative research and development arrangement, or CRADA.

PRGN-2012 is a first-in-class, investigational "off-the-shelf" AdenoVerse immunotherapy for the treatment of recurrent respiratory papillomatosis, or RRP. PRGN-2012 is an innovative therapeutic vaccine with optimized antigen design that uses our gorilla adenovector technology to elicit immune responses directed against cells infected with HPV type 6 and HPV type 11. PRGN-2012 is in a Phase 1 clinical trial for adult patients with RRP. In March 2021, we announced that the first patient was dosed in the PRGN-2012 Phase 1 trial. PRGN-2012 is being developed in collaboration with the Center for Cancer Research at the NCI pursuant to a CRADA. PRGN-2012 was granted Orphan Drug designation for treatment of RRP by the FDA.

In addition to our clinical programs, PGEN Therapeutics has a robust pipeline of preclinical programs that we are pursuing in order to drive long-term value creation. Our pipeline includes a number of product candidates, including UltraCAR-T therapeutics for various cancers, and "off-the-shelf" AdenoVerse immunotherapy for infectious disease, and a multifunctional therapeutic for solid tumors. We expect to continue development of various preclinical programs to identify product candidates for evaluation in clinical trials.

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 with the potential for superior efficacy and safety. 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's most advanced internal pipeline candidate, AG019, is a first-in-class disease modifying antigen-specific, investigational immunotherapy for the prevention, delay, or reversal of type 1 diabetes mellitus, or T1D. AG019 is an easy-to-take capsule formulation of ActoBiotics engineered to deliver the autoantigen human proinsulin, or PINS, and the tolerance-enhancing cytokine human interleukin-10 to the mucosal lining of gastro-intestinal tissues in patients with T1D. AG019 is currently in a Phase 1b/2a clinical trial for the treatment of early-onset T1D. The Phase 1b portion of the study evaluates the safety and tolerability of AG019 monotherapy administered as a single dose and repeated daily doses in adult and adolescent patients. The Phase 2a portion of the study investigates the safety and tolerability of AG019 in combination with teplizumab, or PRV-031. Enrollment and dosing in the Phase 1b and Phase 2a portions of the study are complete. The primary endpoint of assessing safety and tolerability in the Phase 1b monotherapy portion of the study was met, and preliminary results at six months after AG019 monotherapy treatment initiation showed an encouraging trend in C-peptide levels, a biomarker for T1D disease progression. Data from the Phase 2a portion showed that the combination was well-tolerated and the preliminary data at six months after treatment initiation showed an encouraging trend in C-peptide levels compared to baseline levels. No dose-related adverse events or serious adverse events were reported in either portion of this trial.

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, is engineered to address multiple pathways of heart failure. Utilizing a single plasmid comprising all three genes, instead of each individual gene on separately delivered plasmids, INXN-4001 can control for delivery and ensure expression of the three genes in all transfected cells. A first-in-human, open label Phase 1 trial designed to evaluate the safety of retrograde coronary sinus infusion, or RCSI, of INXN-4001 in outpatient left ventricular assist device, or LVAD, recipients has been completed. Six-month follow-up data demonstrated that the study met the primary endpoints to evaluate safety and feasibility for INXN-4001, and analysis of the final results is ongoing.

Partnered Program

We have partnered with Castle Creek Biosciences, Inc. (formerly Fibrocell Science, Inc.), or Castle Creek, to advance product candidates D-Fi (debcoemagene autoficel), formerly designated FCX-007, for the treatment of recessive dystrophic epidermolysis bullosa, or RDEB, and FCX-013 for the treatment of localized scleroderma. In October 2020, Castle Creek announced the dosing of the first patient in the ongoing Phase 3 trial of D-Fi and the dosing of the first patient in the ongoing Phase 1/2 trial of FCX-013. The FDA has granted Orphan Drug designation to D-Fi for the treatment of Dystrophic Epidermolysis Bullosa, which includes RDEB. In addition, D-Fi has been granted Rare Pediatric Disease designation, Fast Track designation, and Regenerative Medicine Advanced Therapy designation by the FDA for treatment of RDEB. The FDA has granted Orphan Drug designation to FCX-013 for the treatment of localized scleroderma. In addition, FCX-013 has been granted Rare Pediatric Disease designation and Fast Track designation for the treatment of moderate to severe localized scleroderma. Pursuant to the collaboration, we licensed our technology platforms to Castle Creek 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 of product candidates. In March 2020, we and Castle Creek terminated

the original collaboration agreement by mutual agreement, with the parties agreeing that FCX-007 and FCX-013 would be treated as "Retained Products" under the terms of the original agreement. Castle Creek retains a license to continue to develop and commercialize the Retained Products within the field of use for so long as Castle Creek 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.

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.

Our Non-Healthcare Business

At March 31, 2021, our only non-healthcare business is our established bovine genetics company, Trans Ova Genetics, L.C., or Trans Ova.

Trans Ova

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 continue to evaluate 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.

COVID-19 Impact

COVID-19 has had and continues to have an extensive impact on the global health and economic environments.

The health and safety of our employees is of the utmost importance. Our essential employees are practicing appropriate safety measures, including social distancing and use of personal protective equipment. These efforts have permitted us to continue to advance our programs, with the ultimate goal of benefiting patients.

Commencing in the second half of March 2020, our healthcare business began to experience delays to certain of our clinical trials as a result of COVID-19. For example, starting in March 2020, we 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. The temporary suspension of the AG019 trial was voluntary and was not related to any patient safety issues in the study. The voluntary suspension of the AG019 trial was lifted in June 2020, and recruitment in the study resumed. 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 that was instituted in light of the COVID-19 pandemic. Recruitment resumed in the PRGN-3005 trial in May 2020. Although these suspensions did not result in significant overall delay, there is uncertainty regarding the duration and severity of the ongoing pandemic, and we could experience further delays of other pandemic-related events that may adversely impact our clinical as well as preclinical pipeline candidates in the future. Notwithstanding the foregoing, 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 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.

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 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.

Discontinued Operations

Historically, we developed technology platforms for application across a variety of diverse end markets, including health, food, energy, and environment. In January 2020, we announced that we were increasing our focus on our healthcare opportunities, which reflected our most advanced platforms, and in connection therewith, we divested a number of our non-healthcare assets (referred to collectively as the Transactions) and changed our name to Precigen, Inc.

In 2020, as a result of market uncertainty driven by the COVID-19 pandemic and the state of the energy sector raising significant challenges for the strategic alternatives pursued by MBP Titan, LLC, or MBP Titan, our methane bioconversion business, we suspended MBP Titan's operations, preserved certain of MBP Titan's intellectual property, terminated all of its personnel, and undertook steps to dispose of its other assets and obligations. The wind down of MBP Titan's activities was substantially complete by December 31, 2020, with the final disposition of certain property and equipment and the facility operating lease occurring in January 2021. This discontinuation of operations represented the continuation of a strategic shift that we commenced in early 2020 to becoming a primarily healthcare company advancing technologies and products that address complex healthcare challenges. After the wind down of MBP Titan, certain assets and contractual obligations which were originally related to MBP Titan continue to be managed at the Precigen corporate level. These remaining assets and contractual obligations include our equity interests in and collaboration agreements with Intrexon Energy Partners, LLC, or Intrexon Energy Partners, and Intrexon Energy Partners II, LLC, or Intrexon Energy Partners II, including the associated deferred revenue remaining under each collaboration agreement, as well as the associated intellectual property.

See also "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 3" appearing elsewhere in this Quarterly Report for additional discussion of our discontinued operations.

See "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 4" appearing elsewhere in this Quarterly Report for a discussion of Intrexon Energy Partners and Intrexon Energy Partners II.

Segments

As of March 31, 2021, our reportable segments were (i) Biopharmaceuticals, (ii) Exemplar, and (iii) Trans Ova. These identified reportable segments met the quantitative thresholds to be reported separately for the three months ended March 31, 2021.

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, gain or loss on disposals of assets, stock-based compensation expense, loss on settlement agreement, and equity in net loss of affiliates. 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. Our historical collaboration and licensing revenues were generated under a business model from which we have gradually transitioned, and we do not expect to expend significant resources servicing our historical collaborations in the future. We may enter into strategic transactions for individual platforms or programs in the future from which we may generate new collaboration and licensing revenues. We continue to generate product and service revenues through our Trans Ova and Exemplar subsidiaries, and in the three months ended March 31, 2021, both of these subsidiaries generated positive Segment Adjusted EBITDA. Products currently in our clinical pipeline will require regulatory approval and/or commercial scale-up before they may commence significant product sales and operating profits.

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 us identifying impairment indicators or recording impairment charges in future periods. In addition, market changes and changes in judgements, 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.

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 have and may continue to mutually terminate collaboration agreements or 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 operating 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. Exemplar also generates product and service revenues through the development and sale of genetically engineered miniature swine models. 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 an existing collaboration or for revenues generated pursuant to future strategic transactions for any of our existing platforms or programs, we expect our collaboration revenues will continue to decrease in the near term. Our revenues will also depend upon our ability to maintain or improve the volume and pricing of Trans Ova's and Exemplar'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.

Our research and development expenses are generally incurred by our reportable segments and primarily relate to either costs incurred to expand or otherwise improve our technologies or the costs incurred to develop our own products and services. Our Biopharmaceuticals segment is progressing preclinical and clinical programs that target urgent and intractable diseases in our core therapeutic areas of immuno-oncology, autoimmune disorders, and infectious diseases, including PRGN-3005, PRGN-3006, AG019, and INXN-4001. Exemplar's research and development activities relate to new and improved pig research models. Trans Ova's research and development activities support new and improved product and service offerings for its customers. The following table summarizes our research and development expenses incurred by reportable segment and reconciles those expenses to research and development expenses on the condensed consolidated statements of operations for the three months ended March 31, 2021 and 2020.

	Three Months Ended March 31,	
	2021	2020
Biopharmaceuticals	$ 10,063	$ 10,641
Exemplar	74	190
Trans Ova	385	640
Total research and development expenses from reportable segments	10,522	11,471
Other research and development expenses	—	(141)
Eliminations	(1)	(3)
Total consolidated research and development expenses	$ 10,521	$ 11,327

The amount of 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 collaboration agreements. We expect that our research and development expenses will increase as we continue to develop our own proprietary programs, including progression of these programs into preclinical and clinical stages. We believe these increases will likely include increased costs paid to consultants and contract research organizations and increased costs related to laboratory supplies.

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 (including the cost of settling any claims and lawsuits), and expenses associated with obtaining and maintaining our intellectual property.

SG&A expenses may fluctuate in the future depending on the scaling of our corporate functions required to support our corporate initiatives and the outcomes of legal claims and assessments against us.

Other income (expense), net

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 issued in July 2018.

Interest income consists of interest earned on our cash and cash equivalents and short-term and long-term investments and may fluctuate based on amounts invested and current interest rates.

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 joint ventures, or JVs, 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. We previously accounted for our investments in start-up entities backed by the Harvest Intrexon Enterprise Fund I, LP, or Harvest, using the equity method of accounting. In December 2020, we entered into an agreement with Harvest to resolve matters related to the parties' contractual and equity relationships and our remaining equity interests in start-up entities backed by Harvest were terminated.

Segment performance

We use Segment Adjusted EBITDA as our primary measure of segment performance. We define Segment Adjusted EBITDA as net income (loss) before (i) interest expense, (ii) income tax expense or benefit, (iii) depreciation and amortization, (iv) stock-based compensation expense, (v) loss on settlement agreements where noncash consideration is paid, (vi) adjustments for accrued bonuses paid in equity awards, (vii) gain or loss on disposals of assets, (viii) loss on impairment of goodwill and other noncurrent assets, (ix) equity in net loss of affiliates, and (x) recognition of previously deferred revenue associated with upfront and milestone payments as well as cash outflows from capital expenditures and investments in affiliates, but includes proceeds from the sale of assets in the period sold. Corporate expenses are not allocated to the segments and are managed at a consolidated level. See "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 19" appearing elsewhere in this Quarterly Report for further discussion of Segment Adjusted EBITDA.

Results of operations

Comparison of the three months ended March 31, 2021 and the three months ended March 31, 2020

The following table summarizes our results of operations for the three months ended March 31, 2021 and 2020, together with the changes in those items in dollars and as a percentage:

	Three Months Ended March 31,		Dollar Change	Percent Change
	2021	2020		
	(In thousands)			
Revenues				
Collaboration and licensing revenues (1)	$ 66	$ 10,721	$ (10,655)	(99.4)%
Product revenues	6,381	4,961	1,420	28.6 %
Service revenues	17,931	13,946	3,985	28.6 %
Other revenues	133	210	(77)	(36.7)%
Total revenues	24,511	29,838	(5,327)	(17.9)%
Operating expenses				
Cost of products	5,574	6,089	(515)	(8.5)%
Cost of services	7,402	7,536	(134)	(1.8)%
Research and development	10,521	11,327	(806)	(7.1)%
Selling, general and administrative	18,702	21,486	(2,784)	(13.0)%
Total operating expenses	42,199	46,438	(4,239)	(9.1)%
Operating loss	(17,688)	(16,600)	(1,088)	6.6 %
Total other expense, net	(4,205)	(3,855)	(350)	9.1 %
Equity in loss of affiliates	(3)	(351)	348	(99.1)%
Loss from continuing operations before income taxes	(21,896)	(20,806)	(1,090)	5.2 %
Income tax benefit (expense)	52	(40)	92	>200%
Loss from continuing operations	(21,844)	(20,846)	(998)	4.8 %
Income (loss) from discontinued operations, net of income taxes (2)	4,526	(35,152)	39,678	112.9 %
Net loss	$ (17,318)	$ (55,998)	$ 38,680	(69.1)%

(1) Includes $0 and $198 from related parties for the three months ended March 31, 2021 and 2020, respectively.

(2) See "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 3" appearing elsewhere in this Quarterly Report.

Collaboration and licensing revenues

Collaboration and licensing revenues decreased $10.7 million, or 99%, from the three months ended March 31, 2020 primarily due to recognition of previously deferred revenue which arose from the termination of a collaboration with Castle Creek in February 2020.

Product revenues and gross margin

Product revenues increased $1.4 million, or 29%, over the three months ended March 31, 2020. The increase in product revenue was primarily due to higher customer demand for animals as a result of stronger beef and dairy industries in the current year. Gross margin on products improved in the current period as a result of the increased revenues, increased focus on selling higher margin products, and operational efficiencies that have been gained through reductions in workforce and improved inventory management.

Service revenues and gross margin

Service revenues increased $4.0 million, or 29%, over the three months ended March 31, 2020. Trans Ova's revenues and gross margins thereon improved primarily due to an increase in services performed as a result of higher customer demand as the beef and dairy industries have been stronger in the current year and a change in pricing structure with certain customers. Additionally, Exemplar's service revenues increased in the current period due to an increase in services performed resulting from a higher demand from existing and new customers, which also improved gross margin on services performed.

Research and development expenses

Research and development expenses decreased $0.8 million, or 7%, from the three months ended March 31, 2020. Salaries, benefits, and other personnel costs decreased $0.7 million in 2021 as we scaled down certain research and development functions in the first quarter of 2020 as a result of certain programs being previously deprioritized.

Selling, general and administrative expenses

SG&A expenses decreased $2.8 million, or 13%, from the three months ended March 31, 2020. Salaries, benefits, and other personnel costs decreased $1.0 million in 2021 primarily due to a reduced headcount as we scaled down our corporate functions to support our more streamlined organization and reduced stock compensation costs for previously granted awards that became fully vested in early 2021. Professional fees decreased $1.0 million primarily due to a decrease in legal fees associated with certain litigation matters that were settled in the second half of 2020.

Segment performance

The following table summarizes Segment Adjusted EBITDA, which is our primary measure of segment performance, for the three months ended March 31, 2021 and 2020, for each of our reportable segments as well as unallocated corporate costs.

	Three Months Ended March 31,		Dollar Change	Percent Change
	2021	2020		
	(In thousands)			
Segment Adjusted EBITDA:				
Biopharmaceuticals	$ (8,854)	$ (10,022)	$ 1,168	11.7 %
Exemplar	1,806	250	1,556	>200%
Trans Ova	6,421	(457)	6,878	>200%
Unallocated corporate costs	(8,194)	(10,838)	2,644	(24.4)%

For a reconciliation of Segment Adjusted EBITDA to net loss from continuing operations 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, 2021 and 2020, for each of our reportable segments.

	Three Months Ended March 31,		Dollar Change	Percent Change
	2021	2020		
	(In thousands)			
Biopharmaceuticals	$ 178	$ 10,862	$ (10,684)	(98.4)%
Exemplar	3,257	2,151	1,106	51.4 %
Trans Ova	21,076	16,785	4,291	25.6 %

Biopharmaceuticals

The decrease in Biopharmaceuticals revenue was due to the accelerated recognition of previously deferred revenue upon the mutual termination of a collaboration with Castle Creek in February 2020. Segment Adjusted EBITDA improved as we deprioritized certain programs and scaled down certain research and development functions in the first quarter of 2020 but were partially offset by increases in costs associated with our clinical and preclinical programs.

Exemplar

Revenues for Exemplar increased due to an increase in services performed resulting from a higher demand from existing and new customers. The improvement in Segment Adjusted EBITDA was primarily due to the increased revenues and reduced costs as a result of operational efficiencies gained through reductions in workforce and improved inventory management.

Trans Ova

Revenues for Trans Ova increased primarily due to higher customer demand for pregnant cows and more procedures performed as a result of stronger beef and dairy industries in the current year. Revenues also increased due to a change in the pricing structure with certain customers. The improvement in Segment Adjusted EBITDA was primarily due to the increased revenues, as well as reduced costs as a result of operational efficiencies gained through reductions in workforce and improved inventory management.

Unallocated Corporate Costs

Unallocated corporate costs decreased primarily due to a reduction of corporate employees as we scaled down our corporate functions to support our more streamlined organization, as well as a decrease in certain professional fees associated with certain litigation matters that were settled in the second half of 2020.

Liquidity and capital resources

Sources of liquidity

We have incurred losses from operations since our inception, and as of March 31, 2021, we had an accumulated deficit of $1.8 billion. From our inception through March 31, 2021, 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, 2021, we had cash and cash equivalents of $27.4 million and short-term and long-term investments of $181.9 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 and from strategic transactions.

As of March 31, 2021, Trans Ova was in compliance with the debt covenants associated with its line of credit as discussed in "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Note 11" appearing elsewhere in this Quarterly Report.

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,	
	2021	2020
	(In thousands)	
Net cash provided by (used in):		
Operating activities	$ (16,384)	$ (27,743)
Investing activities	(129,102)	(36,553)
Financing activities	121,040	34,151
Effect of exchange rate changes on cash, cash equivalents, and restricted cash	(11)	(39)
Net decrease in cash, cash equivalents, and restricted cash	$ (24,457)	$ (30,184)

Cash flows from operating activities:

During the three months ended March 31, 2021, our net loss was $17.3 million, which includes the following significant noncash expenses totaling $12.3 million from both continuing and discontinued operations: (i) $5.4 million of stock-based compensation expense, (ii) $3.5 million of depreciation and amortization expense, (iii) $2.8 million accretion of debt discount and amortization of deferred financing costs, and (iv) $0.6 million of shares issued as payment for services. These expenses

were partially offset by a $4.6 million noncash gain recognized upon the termination of our MBP Titan facility lease in January 2021.

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) $4.8 million of depreciation and amortization expense, (iii) $4.4 million of stock-based compensation 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 with Castle Creek in February 2020.

Our cash outflows from operations during the three months ended March 31, 2021 decreased $11.4 million from the three months ended March 31, 2020 primarily due to (i) increased cash flows provided by Trans Ova and Exemplar due to increased revenues and gross margins thereon, (ii) the reduction in cash requirements for MBP Titan as we suspended those operations in the second quarter of 2020, and (iii) reductions in operating expenses for our ActoBio and corporate operations as we streamlined both in order to further prioritize the use of our capital.

Cash flows from investing activities:

During the three months ended March 31, 2021, we purchased $133.7 million of investments, net of maturities and sales, primarily using the proceeds received from the underwritten public offering discussed below.

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.

Cash flows from financing activities:

During the three months ended March 31, 2021, we received $121.0 million net proceeds from the sale of our common stock in an underwritten public offering.

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 Holdings, LLC.

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.

See the section entitled "Risk Factors" in our Annual Report for additional risks associated with our substantial capital requirements.

Contractual obligations and commitments

The following table summarizes our significant contractual obligations and commitments from continuing operations as of March 31, 2021 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	$ 11,803	$ 3,520	$ 5,008	$ 2,685	$ 590
Convertible debt (1)	200,000	—	200,000	—	—
Cash interest payable on convertible debt	17,500	7,000	10,500	—	—
Long-term debt, excluding convertible debt	3,619	358	765	773	1,723
Total	$ 232,922	$ 10,878	$ 216,273	$ 3,458	$ 2,313

(1) See "Notes to the Condensed Consolidated Financial Statements (Unaudited) - Notes 11" appearing elsewhere in this Quarterly Report for further discussion of our convertible debt.

In addition to the obligations in the table above, as of March 31, 2021 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, 2021, 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, 2021, we also had research and development commitments with third parties totaling $15.2 million that had not yet been incurred.

Net operating losses

As of March 31, 2021, we had net operating loss carryforwards of approximately $796.6 million for U.S. federal income tax purposes available to offset future taxable income, including $543.9 million generated after 2017, U.S. capital loss carryforwards of $211.5 million, and U.S. federal and state research and development tax credits of approximately $10.3 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 beginning in 2024. Our foreign subsidiaries included in continuing operations have foreign loss carryforwards of approximately $78.1 million, most of which do not expire. Excluding certain deferred tax liabilities totaling $2.7 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, 2021, Precigen has utilized all net operating losses subject to Section 382 limitations, other than those losses inherited via acquisitions. As of March 31, 2021, 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. 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 and long-term investments of $209.3 million and $100.1 million as of March 31, 2021 and December 31, 2020, respectively. Our cash and cash equivalents and short-term and long-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.

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 Vice President, Finance & Accounting ("VPFA"), who is our interim 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 VPFA 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 VPFA, 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, 2021, that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

PART II. OTHER INFORMATION

Item 1. Legal Proceedings

In the course of our business, we are involved in litigation or legal matters, including governmental investigations. 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, 2021, 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.

See "Notes to the Condensed Consolidated Financial Statements - Note 16" appearing elsewhere in this Quarterly Report for further discussion of ongoing legal matters.

Item 1A. Risk Factors

As disclosed in "Summary of Risk Factors" and "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.

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
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 D. Bradford Osborne, Vice President, Finance & Accounting (Interim 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 D. Bradford Osborne, Vice President, Finance & Accounting (Interim 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**	Interactive Data File (Quarterly Report on Form 10-Q, for the quarterly period ended March 31, 2021, 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, 2021 and December 31, 2020, (ii) the Condensed Consolidated Statements of Operations for the three months ended March 31, 2021 and 2020, (iii) the Condensed Consolidated Statements of Comprehensive Loss for the three months ended March 31, 2021 and 2020, (iv) the Condensed Consolidated Statements of Shareholders' Equity for the three months ended March 31, 2021 and 2020, (v) the Condensed Consolidated Statements of Cash Flows for the three months ended March 31, 2021 and 2020, and (vi) the Notes to the Condensed Consolidated Financial Statements.
104**	Cover Page Interactive Data File (embedded within the Inline XBRL document).

** Furnished herewith.

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 10, 2021

By: /s/ D. BRADFORD OSBORNE
D. Bradford Osborne
Vice President, Finance & Accounting
(Interim Principal Financial and Accounting Officer)

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 10, 2021

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

Exhibit 31.2

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

I, D. Bradford Osborne, 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 10, 2021

/s/ D. BRADFORD OSBORNE
D. Bradford Osborne
Vice President, Finance & Accounting
(Interim 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, 2021 (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 10, 2021

/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, D. Bradford Osborne, Vice President, Finance & Accounting, 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, 2021 (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 10, 2021

/s/ D. BRADFORD OSBORNE
D. Bradford Osborne
Vice President, Finance & Accounting
(Interim 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.