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

FORM 10-Q

(Mark One)

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

For the quarterly period ended June 30, 2020

or

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

For the transition period from to

Commission file number: 001-34705

Codexis, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**71-0872999**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
200 Penobscot Drive, Redwood City, California	**94063**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (650) 421-8100

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

Title of Each Class	Trading Symbol(s)	Name of Each Exchange on Which Registered
Common Stock, par value $0.0001 per share	CDXS	The 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 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 July 31, 2020, there were 59,126,820 shares of the registrant's Common Stock, par value $0.0001 per share, outstanding.

Codexis, Inc.
Quarterly Report on Form 10-Q
For the Quarter Ended June 30, 2020

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PART I. FINANCIAL INFORMATION

Item 1. Financial Statements

Codexis, Inc.
Condensed Consolidated Balance Sheets
(Unaudited)
(In Thousands, Except Per Share Amounts)

	June 30, 2020	December 31, 2019
Assets		
Current assets:		
Cash and cash equivalents	$ 75,649	$ 90,498
Restricted cash, current	619	661
Financial assets:		
Accounts receivable	14,035	9,063
Contract assets	—	1,027
Unbilled receivables	12,412	10,099
Total Financial assets	26,447	20,189
Less: allowances	(34)	(34)
Total Financial assets, net	26,413	20,155
Inventories	686	371
Prepaid expenses and other current assets	3,131	2,520
Total current assets	106,498	114,205
Restricted cash	1,062	1,062
Investment in Equity Securities	1,000	—
Right-of-use assets - Operating leases, net	22,599	23,837
Right-of-use assets - Finance leases, net	170	268
Property and equipment, net	6,822	6,282
Goodwill	3,241	3,241
Other non-current assets	391	178
Total assets	$ 141,783	$ 149,073
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 2,637	$ 2,621
Accrued compensation	4,979	5,003
Other accrued liabilities	6,943	6,540
Current portion of lease obligations - Operating leases	2,482	1,107
Current portion of lease obligations - Finance leases	—	60
Deferred revenue	1,903	57
Total current liabilities	18,944	15,388
Deferred revenue, net of current portion	3,142	1,987
Long-term lease obligations - Operating leases	23,665	24,951
Other long-term liabilities	1,246	1,230
Total liabilities	46,997	43,556
Commitments and Contingencies (Note 11)		
Stockholders' equity:		
Preferred stock, $0.0001 par value per share; 5,000 shares authorized, none issued and outstanding	—	—
Common stock, $0.0001 par value per share; 100,000 shares authorized; 59,125 shares and 58,877 shares issued and outstanding at June 30, 2020 and December 31, 2019, respectively	6	6
Additional paid-in capital	451,185	447,920
Accumulated deficit	(356,405)	(342,409)
Total stockholders' equity	94,786	105,517
Total liabilities and stockholders' equity	$ 141,783	$ 149,073

See accompanying notes to the unaudited condensed consolidated financial statements

Codexis, Inc.

Condensed Consolidated Statements of Operations
(Unaudited)
(In Thousands, Except Per Share Amounts)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2020	**2019**	**2020**	**2019**
Revenues:				
Product revenue	$ 4,504	$ 6,249	$ 9,604	$ 14,236
Research and development revenue	10,463	6,070	20,033	13,665
Total revenues	14,967	12,319	29,637	27,901
Costs and operating expenses:				
Cost of product revenue	1,699	2,772	4,240	7,163
Research and development	10,853	8,274	21,820	16,290
Selling, general and administrative	8,522	7,896	17,512	16,311
Total costs and operating expenses	21,074	18,942	43,572	39,764
Loss from operations	(6,107)	(6,623)	(13,935)	(11,863)
Interest income	57	220	323	450
Other income (expenses), net	13	(88)	(72)	(211)
Loss before income taxes	(6,037)	(6,491)	(13,684)	(11,624)
Provision for income taxes	307	16	312	19
Net loss	$ (6,344)	$ (6,507)	$ (13,996)	$ (11,643)
Net loss per share, basic and diluted	$ (0.11)	$ (0.12)	$ (0.24)	$ (0.21)
Weighted average common stock shares used in computing net loss per share, basic and diluted	59,000	54,954	58,944	54,564

See accompanying notes to the unaudited condensed consolidated financial statements

Codexis, Inc.

Condensed Consolidated Statements of Stockholders' Equity
(Unaudited)
(In Thousands)

Three months ended June 30, 2020	Common Stock Shares	Common Stock Amount	Additional paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
Balance as of April 1, 2020	59,017	$ 6	$ 449,121	$ (350,061)	$ 99,066
Exercise of stock options	27	—	158	—	158
Release of stock awards	81	—	—	—	—
Employee stock-based compensation	—	—	1,935	—	1,935
Non-employee stock-based compensation	—	—	4	—	4
Taxes paid related to net share settlement of equity awards	—	—	(33)	—	(33)
Net loss	—	—	—	(6,344)	(6,344)
Balance as of June 30, 2020	59,125	$ 6	$ 451,185	$ (356,405)	$ 94,786

Three months ended June 30, 2019	Common Stock Shares	Common Stock Amount	Additional paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
Balance as of April 1, 2019	54,541	$ 5	$ 386,815	$ (335,610)	$ 51,210
Exercise of stock options	310	—	2,067	—	2,067
Release of stock awards	40	—	—	—	—
Employee stock-based compensation	—	—	1,988	—	1,988
Issuance of common stock, net of issuance costs of $74	3,049	1	49,925	—	49,926
Net loss	—	—	—	(6,507)	(6,507)
Balance as of June 30, 2019	57,940	$ 6	$ 440,795	$ (342,117)	$ 98,684

See accompanying notes to the unaudited condensed consolidated financial statements

Codexis, Inc.

Condensed Consolidated Statements of Stockholders' Equity
(Unaudited)
(In Thousands)

Six months ended June 30, 2020	Common Stock Shares	Common Stock Amount	Additional paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
Balance as of January 1, 2020	58,877	$ 6	$ 447,920	$ (342,409)	$ 105,517
Exercise of stock options	32	—	197	—	197
Release of stock awards	300	—	—	—	—
Employee stock-based compensation	—	—	4,104	—	4,104
Non-employee stock-based compensation	—	—	4	—	4
Taxes paid related to net share settlement of equity awards	(84)	—	(1,040)	—	(1,040)
Net loss	—	—	—	(13,996)	(13,996)
Balance as of June 30, 2020	59,125	$ 6	$ 451,185	$ (356,405)	$ 94,786

Six months ended June 30, 2019	Common Stock Shares	Common Stock Amount	Additional paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
Balance as of January 1, 2019	54,065	$ 5	$ 386,775	$ (330,474)	$ 56,306
Exercise of stock options	529	—	2,843	—	2,843
Release of stock awards	441	—	—	—	—
Employee stock-based compensation	—	—	4,051	—	4,051
Taxes paid related to net share settlement of equity awards	(144)	—	(2,799)	—	(2,799)
Issuance of common stock, net of issuance costs of $74	3,049	1	49,925	—	49,926
Net loss	—	—	—	(11,643)	(11,643)
Balance as of June 30, 2019	57,940	$ 6	$ 440,795	$ (342,117)	$ 98,684

See accompanying notes to the unaudited condensed consolidated financial statements

Codexis, Inc.
Condensed Consolidated Statements of Cash Flows
(Unaudited, in Thousands)

	Six Months Ended June 30,	
	2020	**2019**
Operating activities:		
Net loss	$ (13,996)	$ (11,643)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation	900	693
Amortization expense - right-of-use assets - operating and finance leases	1,336	1,486
Gain on disposal of property and equipment	—	(1)
Stock-based compensation	4,108	4,051
Unrealized loss on investment in equity securities	—	168
Changes in operating assets and liabilities:		
Accounts receivable, net	(4,972)	(262)
Contract assets	1,027	35
Unbilled receivables	(2,313)	365
Inventories	(315)	(131)
Prepaid expenses and other current assets	(611)	(882)
Other non-current assets	(213)	59
Accounts payable	(19)	(1,625)
Accrued compensation	(24)	(721)
Other accrued liabilities	1,863	402
Other long-term liabilities	(1,270)	(715)
Deferred revenue	3,001	812
Net cash used in operating activities	(11,498)	(7,909)
Investing activities:		
Purchase of property and equipment	(1,490)	(1,258)
Proceeds from disposal of property and equipment	—	1
Investment in equity securities	(1,000)	—
Net cash used in investing activities	(2,490)	(1,257)
Financing activities:		
Proceeds from exercises of stock options	197	2,843
Proceeds from issuance of common stock in connection with private placement	—	50,000
Costs incurred in connection with private placement	—	(74)
Payments of lease obligations - Finance leases	(60)	(119)
Taxes paid related to net share settlement of equity awards	(1,040)	(2,799)
Net cash provided by (used in) financing activities	(903)	49,851
Net increase (decrease) in cash, cash equivalents and restricted cash	(14,891)	40,685
Cash, cash equivalents and restricted cash at the beginning of the period	92,221	54,485
Cash, cash equivalents and restricted cash at the end of the period	$ 77,330	$ 95,170
Supplemental disclosure of cash flow information		
Interest paid	$ 4	$ 9
Income taxes paid	$ 5	$ —
Purchase of property and equipment recorded in accounts payable and accrued expenses	$ 90	$ 773

The following table provides a reconciliation of cash, cash equivalents and restricted cash reported within the unaudited condensed consolidated balance sheets as of June 30, 2020 and 2019 to the total of the same such amounts shown above:

	June 30,	
	2020	**2019**
Cash and cash equivalents	$ 75,649	$ 93,421
Restricted cash, current and non-current	1,681	1,749
Total cash, cash equivalents and restricted cash at the end of the period	$ 77,330	$ 95,170

See accompanying notes to the unaudited condensed consolidated financial statements

Note 1. Description of Business

In these notes to the unaudited condensed consolidated financial statements, the “Company,” “we,” “us,” and “our” refers to Codexis, Inc. and its subsidiaries on a consolidated basis.

We discover, develop and sell proteins that deliver value to our clients in a growing set of industries. We view proteins as a vast untapped source of value-creating materials, and we are using our proven technologies, which we have been continuously improving since our inception in 2002, to commercialize an increasing number of novel proteins, both as proprietary Codexis products and in partnership with our customers.

We are a pioneer in the harnessing of computational technologies to drive biology advancements. Since 2002, we have made substantial investments in the development of our CodeEvolver® protein engineering technology platform, the primary source of our competitive advantage. Our technology platform is powered by proprietary, artificial intelligence-based, computational algorithms that rapidly mine our large and continuously growing library of protein variants’ performance attributes. These computational outputs enable increasingly reliable predictions for next generation protein variants to be engineered, enabling delivery of targeted performance enhancements in a time-efficient manner. In addition to its computational prowess, our CodeEvolver® protein engineering technology platform integrates additional modular competencies, including robotic high-throughput screening and genomic sequencing, organic chemistry and process development which are all coordinated to create our novel protein innovations.

Our approach to developing commercially viable biocatalytic manufacturing processes begins by conceptually designing the most cost-effective and practical process for a targeted product. We then develop optimized protein catalysts to enable that process design, using our CodeEvolver® protein engineering platform technology. Engineered protein catalyst candidates - many thousands for each protein engineering project - are then rapidly screened and validated in high throughput screening under relevant manufacturing operating conditions. This approach results in an optimized protein catalyst enabling cost-efficient processes that typically are relatively simple to run in conventional manufacturing equipment. This also allows for the efficient technical transfer of our process to our manufacturing partners.

The successful embodiment of our CodeEvolver® protein engineering technology platform in commercial manufacturing processes requires well-integrated expertise in a number of technical disciplines. In addition to those directly involved in practicing our CodeEvolver® protein engineering platform technology, such as molecular biology, enzymology, microbiology, cellular engineering, metabolic engineering, bioinformatics, biochemistry and high throughput analytical chemistry, our process development projects also involve integrated expertise in organic chemistry, chemical process development, chemical engineering, fermentation process development and fermentation engineering. Our integrated, multi-disciplinary approach to biocatalyst and process development is a critical success factor for the Company.

We initially commercialized our CodeEvolver® protein engineering technology platform and products in the pharmaceuticals market, which remains a primary business focus. Our customers, which include many large global pharmaceutical companies, use our technology, products and services in their manufacturing processes and process development. We have also licensed our proprietary CodeEvolver® protein engineering technology platform to global pharmaceutical companies so that they may in turn use this technology to engineer enzymes for their own businesses. Most recently, in May 2019, we entered into a Platform Technology Transfer and License Agreement (the “Novartis CodeEvolver® Agreement”) with Novartis Pharma AG (“Novartis”). The Novartis CodeEvolver® Agreement allows Novartis to use our proprietary CodeEvolver® protein engineering platform technology in the field of human healthcare.

As evidence of our strategy to extend our technology beyond pharmaceutical manufacturing, we have also used the technology to develop protein catalysts and industrial enzymes for use in a wider set of industrial markets. These target industries consist of several large market verticals, including food and food ingredients, animal feed, consumer care, flavors, fragrances and agricultural chemicals. In addition, we are using our technology to develop enzymes for customers using next generation sequencing ("NGS") and polymerase chain reaction ("PCR/qPCR") for in vitro molecular diagnostic and genomic research applications. In December 2019, we entered into a license agreement to provide Roche Sequencing Solutions, Inc. (“Roche”) with our first enzyme for this target market, the Company's EvoT4™ DNA ligase. In June 2020, we entered into a co-marketing and enzyme supply collaboration agreement with Alphazyme LLC for the production and co-marketing of enzymes for life science applications including, initially, high-fidelity DNA polymerase, T7 RNA polymerase and reverse transcriptase enzymes.

We have also begun using the CodeEvolver® protein engineering technology platform to develop early stage, novel biotherapeutic product candidates, both for our customers and for our own business. In October 2017, we entered into the "Nestlé Agreement" with Nestlé Health Science to advance CDX-6114, our enzyme biotherapeutic product candidate for the potential treatment of phenylketonuria ("PKU"). PKU is an inherited metabolic disorder in which the enzyme that converts the essential amino acid phenylalanine into tyrosine is deficient. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive license to develop and commercialize CDX-6114In March 2020, we entered into a Strategic Collaboration and License Agreement ("Takeda Agreement") with Shire Human Genetic Therapies, Inc., a wholly-owned subsidiary of Takeda Pharmaceutical Company Limited ("Takeda"), for the research and development of novel gene therapies for certain disease indications, including the treatment of lysosomal storage disorders and blood factor deficiencies.

Below are brief descriptions of our business segments:

Performance Enzymes

We initially commercialized our CodeEvolver® protein engineering technology platform and products in the pharmaceuticals market, and to date this continues to be our largest market served. Our customers, which include many large global pharmaceutical companies, use our technology, products and services in their manufacturing processes and process development. We have also used the technology to develop customized enzymes for use in other industrial markets. These markets consist of several large industrial verticals, including food and food ingredients, animal feed, consumer care, flavors, fragrances, and agricultural chemicals. We also use our technology to develop enzymes for customers using NGS and PCR/qPCR for in vitro molecular diagnostic and molecular biology research applications.

Novel Biotherapeutics

We are also targeting new opportunities in the pharmaceutical industry to discover, improve, and/or develop biotherapeutic drug candidates. We believe that our CodeEvolver® protein engineering platform technology can be used to discover novel biotherapeutic drug candidates that will target human diseases that are in need of improved therapeutic interventions. Similarly, we believe that we can deploy our platform technology to improve specific characteristics of a customer's pre-existing biotherapeutic drug candidate, such as its activity, stability or immunogenicity.

Our first lead program was for the potential treatment of hyperphenylalaninemia ("HPA") (also referred to as PKU) in humans. PKU is an inherited metabolic disorder in which the enzyme that converts the essential amino acid phenylalanine into tyrosine is deficient. In October 2017, we announced a global development, option and license agreement with Nestlé Health Science to advance CDX-6114, our own novel orally administrable enzyme therapeutic candidate for the potential treatment of PKU. In July 2018, we announced that we had dosed the first subjects in a first-in-human Phase 1a dose-escalation trial with CDX-6114, which was conducted in Australia. In November 2018, we announced top-line results from the Phase 1a study in healthy volunteers with CDX-6114. In December 2018, Nestlé Health Science became obligated to pay us an additional $1.0 million within 60 days after the achievement of a milestone relating to formulation of CDX-6114. In January 2019, we received notice from the U.S. Food and Drug Administration that it had completed its review of our investigational drug application for CDX-6114 and concluded that we may proceed with the proposed Phase 1b multiple ascending dose study in healthy volunteers in the United States. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive, worldwide, royalty-bearing, sub-licensable license for the global development and commercialization of CDX-6114 for the management of PKU. In January 2020, we and Nestlé Health Science entered into a development agreement pursuant to which we and Nestlé Health Science are collaborating to advance a lead candidate targeting a gastro-intestinal disorder discovered through our Strategic Collaboration Agreement into pre-clinical and early clinical studies. The Strategic Collaboration Agreement was extended through December 2021. Using our CodeEvolver® protein engineering platform technology, we have also developed a pipeline of other biotherapeutic drug candidates, all of which are in preclinical development.

Our most recent achievement in novel biotherapeutics came in March 2020, when we announced a strategic collaboration and license agreement with Takeda in which we will collaborate with Takeda to research and develop protein sequences for use in gene therapy products for certain disease indications. Under the terms of the Takeda Agreement, we will generate novel gene sequences encoding protein variants tailored to enhance efficacy as a result of increased activity, stability, and cellular uptake using our CodeEvolver® protein engineering platform. Takeda will combine these improved transgenes with its gene therapy capabilities to generate novel candidates for the treatment of rare genetic disorders. We are currently collaborating on three initial programs for the treatment of Fabry disease, Pompe disease, and an unnamed blood factor deficiency. The Company is responsible for the creation of novel enzyme sequences for advancement as gene therapies into pre-clinical development. Takeda is responsible for the pre-clinical and clinical development and commercialization of gene therapy products resulting from the collaboration programs. Under the terms of the agreement, in addition to the three initial programs, Takeda may initiate up to four additional programs for separate target indications. In March 2020, we began research and development activities under the program plans and received a $8.5 million one-time, non-refundable cash payment.

We expect to continue to make additional investments in our pipeline with the aim of advancing additional product candidates targeting other therapeutic areas.

For additional discussion of our business segments, see Note 13, "Segment, Geographical and Other Revenue Information."

Business Update Regarding COVID-19

We are subject to risks and uncertainties as a result of the current COVID-19 pandemic. The COVID-19 pandemic has presented a substantial public health and economic challenge around the world and is affecting our employees, communities and business operations, as well as the U.S. economy and other economies worldwide. The full extent to which the COVID-19 pandemic will directly or indirectly impact our business, results of operations and financial condition will depend on future developments that are highly uncertain and cannot be accurately predicted, including the duration and severity of the pandemic and the extent and severity of the impact on our customers, new information that may emerge concerning COVID-19, the actions taken to contain it or treat its impact and the economic impact on local, regional, national and international markets.

To date, we and our collaboration partners have been able to continue to supply our enzymes to our customers worldwide. However, we are dependent on our manufacturing and logistics partners and consequently, disruptions in operations of our partners and customers may affect our ability to supply enzymes to our customers. Furthermore, our ability to provide future research and development ("R&D") services will continue to be impacted as a result of governmental orders and any disruptions in operations of our customers with whom we collaborate. We are continuing to assess the potential impact of the COVID-19 pandemic on our business and operations, including our product sales, R&D service revenue, expenses and manufacturing. However, we are unable to fully determine and quantify the extent to which this pandemic affected our total revenues due to complex accounting judgments.

In the U.S., the impact of COVID-19, including governmental orders ("Orders") governing the operation of businesses during the pandemic, caused the temporary closure of our Redwood City, California facilities and has disrupted our research and development operations. Research and development operations for all other projects were temporarily suspended from mid-March 2020 through the end of April in accordance with these Orders. In May 2020, we initiated limited operations and gradually ramped up our R&D operations so that we are currently utilizing the majority of our normal R&D capacity. Additionally, we have resumed small scale manufacturing at our Redwood City pilot plant in May 2020.

Our future results of operations and liquidity could be adversely impacted by delays in payments of outstanding receivable amounts beyond normal payment terms, supply chain disruptions and uncertain demand, and the impact of any initiatives or programs that we may undertake to address financial and operations challenges faced by our customers. As of the date of issuance of the unaudited condensed consolidated financial statements, the extent to which the COVID-19 pandemic may materially impact our financial condition, liquidity, or results of operations is uncertain in the future.

Recent Investing Activities

In June 2020, we entered into a Master Collaboration and Research Agreement with Molecular Assemblies, Inc. (“MAI”), a privately held company, to engineer enzymes to deliver differentiated and cost-effective solutions for the enzymatic synthesis of DNA (“MAI Agreement”). Under an associated stock purchase agreement, we purchased 1,587,050 shares of MAI's Series A preferred stock for $1.0 million, and in connection with our investment, John Nicols, our chief executive officer joined MAI’s board of directors. Under the MAI Agreement, for a fixed monthly fee payable in shares of Series A preferred stock, we will apply our CodeEvolver® protein engineering platform technology to improve the DNA polymerase enzymes that are critical for enzymatic DNA synthesis. Through the provision of these services, we are eligible to earn additional shares of Series A preferred stock. MAI will combine its advanced chemistries with our enzymes to drive the process to commercialization. For additional information, see Note 12, "Related Party Transactions," in the Notes to Unaudited Condensed Consolidated Financial Statements included in this Quarterly Report on Form 10-Q.

Note 2. Basis of Presentation and Summary of Significant Accounting Policies

Basis of Presentation and Principles of Consolidation

The accompanying unaudited condensed consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States of America ("GAAP") and the applicable rules and regulations of the Securities and Exchange Commission ("SEC") for interim financial information. Accordingly, they do not include all the information and notes required by GAAP for complete financial statements. These interim unaudited condensed consolidated financial statements should be read in conjunction with the audited consolidated financial statements and notes thereto contained in our Annual Report on Form 10-K for the year ended December 31, 2019. The condensed consolidated balance sheet at December 31, 2019 has been derived from the audited consolidated financial statements at that date, but does not include all disclosures, including notes, required by GAAP for complete financial statements. The significant accounting policies used in preparation of the unaudited condensed consolidated financial statements for the three and six months ended June 30, 2020 are consistent with those discussed in Note 2 to the audited consolidated financial statements in the Company's 2019 Annual Report on Form 10-K and are updated below as necessary.

Certain prior year amounts have been reclassified to conform to 2020 presentation. In June 2016, the Financial Accounting Standards Board ("FASB") issued guidance requiring implementation of a new impairment model applicable to financial assets measured at amortized cost which, among other things required that accounts receivable, contract assets, unbilled receivables and related allowances be reclassified as financial assets.

Except as noted above, the unaudited condensed consolidated financial statements have been prepared on the same basis as the audited consolidated financial statements and, in the opinion of management, reflect all adjustments of a normal recurring nature considered necessary to present fairly our financial position as of June 30, 2020, results of our operations for the three and six months ended June 30, 2020 and 2019, changes in stockholders' equity for the three and six months ended June 30, 2020 and 2019, and cash flows for the six months ended June 30, 2020 and 2019. The interim results are not necessarily indicative of the results for any future interim period or for the entire year. The results of the six months ended June 30, 2020 reflect the adoption of the accounting standards including: Accounting Standard Update ("ASU") 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* which added a new impairment model applicable to our financial assets measured at amortized cost, and (ii) ASU No. 2017-04, *Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment,*which adjusts testing for goodwill impairment. See "Recently adopted accounting pronouncements" for details regarding the adoption of these standards.

The unaudited interim condensed consolidated financial statements include the accounts of Codexis, Inc. and its wholly owned subsidiaries. All significant intercompany balances and transactions have been eliminated in consolidation.

Use of Estimates

The preparation of our unaudited condensed consolidated financial statements in conformity with GAAP requires us to make estimates, judgments and assumptions that may affect the reported amounts of assets, liabilities, equity, revenues and expenses and related disclosure of contingent assets and liabilities. We regularly assess these estimates which primarily affect revenue recognition, the interest rate used to adjust the promised amount of consideration for the effects of significant financial assets (comprised of accounts receivable, contract assets, and unbilled receivables), inventories, goodwill arising out of business acquisitions, accrued liabilities, stock awards, and the valuation allowances associated with deferred tax assets. Actual results could differ from those estimates and such differences may be material to the unaudited condensed consolidated financial statements. The full extent to which the COVID-19 pandemic will directly or indirectly impact our business, results of operations and financial condition, including sales, expenses, reserves and allowances, manufacturing, research and development costs and employee-related amounts, will depend on future developments that are highly uncertain, including as a result of new information that may emerge concerning COVID-19 and the actions taken to contain or treat COVID-19, as well as the economic impact on local, regional, national and international customers, markets and economies.

Financial assets and Allowances

We currently sell enzymes primarily to pharmaceutical and fine chemicals companies throughout the world by the extension of trade credit terms based on an assessment of each customer's financial condition. Trade credit terms are generally offered without collateral and may include an insignificant discount for prompt payment for specific customers. To manage our credit exposure, we perform ongoing evaluations of our customers' financial conditions. In addition, accounts receivable include amounts owed to us under our collaborative research and development agreements. We recognize accounts receivable at invoiced amounts and we maintain a valuation allowance as follows:

Allowance for credit losses from January 1, 2020

On and subsequent to January 1, 2020, our financial results reflect an impairment model (known as the "current expected credit loss model" or "CECL") based on estimates and forecasts of future conditions requiring recognition of a lifetime of expected credit losses at inception on our financial assets measured at amortized costs which is comprised of accounts receivable, contract assets, and unbilled receivables. We have determined that our financial assets share similar risk characteristics including: (i) customer origination in the pharmaceutical and fine chemicals industry, (ii) similar historical credit loss pattern of customers (iii) no meaningful trade receivable differences in terms, (iv) similar historical credit loss experience and (v) our belief that the composition of certain assets are comparable to our historical portfolio used to develop loss history. As a result, we measured the allowance for credit loss ("ACL") on a collective basis. Our ACL methodology considers how long the asset has been past due, the financial condition of the customers, which includes ongoing quarterly evaluations and assessments of changes in customer credit ratings, and other market data that we believe are relevant to the collectability of the assets. Nearly all financial assets are due from customers that are highly rated by major rating agencies and have a long history of no credit loss. We derive our ACL by establishing an impairment rate attributable to assets not yet identified as impaired.

We derive our ACL by initially relying on our historical financial asset loss rate which contemplates the full contractual life of the assets sharing similar risk characteristics, adjusted to reflect (i) the extent to which we have determined current conditions differ from the conditions that existed for the period over which historical loss information was evaluated and (ii) by taking into consideration the changes in certain macroeconomic historical and forecasted information. We apply the ACL to past due financial assets and record charges to the ACL as a provision to credit loss expense in the Statement of Operations. Financial assets we identify as uncollectible are also charged against the ACL. We adjust the impairment rate to reflect the extent to which we have determined current conditions differ from the conditions that existed for the period over which historical loss information was evaluated. Adjustments to historical loss information may be qualitative or quantitative in nature and reflect changes related to relevant data.

In the three and six months ended June 30, 2020, inputs to our CECL forecast incorporated forward-looking adjustments associated with the COVID-19 pandemic which we believe are appropriate to incorporate due to the uncertainty of the economic impact on cash flows from our financial assets.

Allowance for credit losses before January 1, 2020

Prior to January 1, 2020, the allowances for doubtful accounts reflected our best estimates of probable losses inherent in our accounts receivable, contract assets, and unbilled receivables balances. The allowance determination was based on known troubled accounts, historical experience, and other currently available evidence. Uncollectible accounts receivable were written off against the allowance for doubtful accounts when all efforts to collect them have been exhausted. Recoveries were recognized when they were received. Actual collection losses may differ from our estimates and could be material to our consolidated financial position, results of operations, and cash flows.

Investment in Equity Securities

We own an equity investment in Molecular Assemblies, Inc. ("MAI") which is a privately held company. Concurrently with our initial equity investment, John Nicols, our chief executive officer, joined MAI's board of directors, and we entered into the MAI Agreement pursuant to which we will provide technical services and expertise in exchange for compensation in the form of additional shares of voting preferred stock. We and MAI envision entering into an arrangement to commercialize products developed under the MAI Agreement.

To analyze the fair value measurement of our equity investment in MAI, we perform a qualitative analysis using significant unobservable inputs. Significant changes to the unobservable inputs may result in a significantly higher or lower fair value estimate. We may value our equity investment based on significant recent arms-length equity transactions with sophisticated non-strategic unrelated new investors, providing the terms of these equity transactions are substantially similar to the equity transactions terms between the company and us. The impact of the difference in transaction terms on the market value of the portfolio company may be difficult or impossible to quantify.

We evaluate our investment for impairment when circumstances indicate that we may not be able to recover the carrying value. We impair our investment when we determine that there has been an "other-than-temporary" decline in the company's estimated fair value compared to its carrying value. We calculate the estimated fair value of the investment using information from the company, which may include:

- Audited and unaudited financial statements;
- Projected technological developments of the company;
- Projected ability of the company to service its debt obligations;

- If a deemed liquidation event were to occur;
- Current fundraising transactions;
- Current ability of the company to raise additional financing if needed;
- Changes in the economic environment which may have a material impact on the operating results of the company;
- Qualitative assessment of key management;
- Contractual rights, obligations or restrictions associated with the investment; and
- Other factors deemed relevant by our management to assess valuation.
- The valuation may be reduced if the company's potential has deteriorated significantly. If the factors that led to a reduction in valuation are overcome, the valuation may be readjusted.

Goodwill

Goodwill represents the excess of consideration transferred over the fair value of net assets of businesses acquired and is assigned to reporting units. We test goodwill for impairment considering amongst other things, whether there have been sustained declines in the trading price of our stock on the Nasdaq Global Select Market. If we conclude it is more likely than not that the fair value of a reporting unit is less than its carrying amount, a quantitative fair value test is performed. We manage our business as two reporting units and we test goodwill for impairment at the reporting unit level. We allocated goodwill to the two reporting units using a relative fair value allocation methodology that primarily relied on our estimates of revenue and future earnings for each reporting unit. Using the relative fair value allocation methodology, we have determined that approximately 76% of goodwill was to be allocated to the Performance Enzymes segment and24% allocated to the Novel Biotherapeutics segment. As a result of the calculation, $2.4 million of the goodwill is assigned to the Performance Enzymes segment and $0.8 million is assigned to the Novel Biotherapeutics segment. We test goodwill for impairment on an annual basis on the last day of the fourth fiscal quarter and, when specific circumstances dictate, between annual tests, by first assessing qualitative factors to determine whether it is more likely than not that the fair value of a reporting unit is less than its carrying amount. During 2020 and 2019, we did not record impairment charges related to goodwill. We test for goodwill impairment is as follows:

Goodwill impairment testing from January 1, 2020

On and subsequent to January 1, 2020, we test for goodwill impairment by comparing the fair value of each reporting unit to its respective carrying value. Using the relative fair value allocation methodology for assets and liabilities used in both of our reporting units, we compare the allocated carrying amount of each reporting unit’s net assets and the assigned goodwill to its fair value. If the fair value of the reporting unit exceeds its carrying amount, goodwill of the reporting unit is considered not impaired. Any excess of the reporting unit’s carrying amount of goodwill over its fair value is recognized as an impairment.

Goodwill impairment testing before January 1, 2020

Prior to January 1, 2020, the goodwill impairment test consisted of a two-step process. The first step of the goodwill impairment test, used to identify potential impairment, compared the fair value of each reporting unit to its carrying value. Using the relative fair value allocation methodology for assets and liabilities used in both of our reporting units, we compared the allocated carrying amount of each reporting unit’s net assets and the assigned goodwill to its fair value. If the fair value of the reporting unit exceeded its carrying amount, goodwill of the reporting unit was considered not impaired, and the second step of the impairment test was not required. The second step, if required, compared the implied fair value of the reporting unit’s goodwill with the carrying amount of that goodwill. Implied fair value was the excess of the fair value of the reporting unit over the fair value of all identified or allocated assets and liabilities. Any excess of the reporting unit’s carrying amount goodwill over the respective implied fair value was recognized as an impairment.

Interim Goodwill Impairment Testing

We tested goodwill for impairment in the quarter ended June 30, 2020. In late 2019, COVID-19 was reported to have surfaced and has since spread worldwide. The impact of COVID-19 has caused a decline in global and domestic macroeconomic conditions, the general deterioration of the U.S. economy and other economies worldwide, all of which may negatively impact our overall financial performance, driving a reduction in our cash flows. We believe that the impact of the COVID-19 pandemic was a triggering event that gave rise to the need to perform a goodwill impairment test. We tested for goodwill impairment by comparing the fair value of each reporting unit to its respective carrying value. We used the relative fair value allocation methodology for assets and liabilities used in both of our reporting units. We compared the allocated carrying amounts of each reporting unit’s net assets at June 30, 2020 and the assigned goodwill to its fair value at June 30, 2020. We concluded that there was no goodwill impairment at June 30, 2020.

Segment Reporting

We report two business segments, Performance Enzymes and Novel Biotherapeutics, which are based on our operating segments. Operating segments are defined as components of an enterprise about which separate financial information is available that is evaluated regularly by the chief operating decision maker ("CODM"), or decision making group, in deciding how to allocate resources, and in assessing performance. Our CODM is our Chief Executive Officer. Our business segments are primarily based on our organizational structure and our operating results as used by our CODM in assessing performance and allocating resources for the Company. We do not allocate or evaluate assets by segment.

The Novel Biotherapeutics segment focuses on new opportunities in the pharmaceutical industry to discover or improve novel biotherapeutic drug candidates that will target human diseases that are in need of improved therapeutic interventions. The Performance Enzymes segment consists of protein catalyst products and services with focus on pharmaceutical, food, molecular diagnostics, and other industrial markets.

Income Taxes

Changes to Tax Law

On March 27, 2020, the Coronavirus Aid, Relief, and Economic Security Act (“CARES Act”), P.L. 116-136,was passed into law, amending portions of certain relevant US tax laws. The CARES Act includes a number of federal income tax law changes, including, but not limited to: (i) permitting net operating loss carrybacks to offset 100% of taxable income for taxable years beginning before 2021, (ii) accelerating alternative minimum tax credit refunds, (iii) temporarily increasing the allowable business interest deduction from 30% to 50% of adjusted taxable income, and (iv) providing a technical correction for depreciation related to qualified improvement property. The Company is currently evaluating if it will claim the Employee Retention Credit and apply for payroll tax deferrals under the CARES Act.

Accounting Pronouncements

Recently adopted accounting pronouncements

In June 2016, the FASB issued ASU 2016-13,*Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments,* which amends the FASB's guidance on the impairment of financial instruments. The standard adds a new impairment model, known as CECL, which replaces the probable loss model. The CECL impairment model is based on estimates and forecasts of future conditions which requires recognition of a lifetime of expected credit losses at inception on financial assets measured at amortized costs. Our financial assets measured at amortized cost are comprised of accounts receivable, contract assets, and unbilled receivables. We adopted the new standard in the first quarter of 2020 using a modified retrospective approach requiring a cumulative-effect adjustment to the opening accumulated deficit as of the date of adoption. The ASU establishes a new valuation account “allowance for credit losses” replacing the “allowance for doubtful accounts” in the consolidated balance sheet, which is used to adjust the amortized cost basis of assets in presentation of the net amount expected to be collected. The adoption required certain additional disclosures but had no other impact on our unaudited condensed consolidated financial statements.

In January 2017, the FASB issued ASU No. 2017-04,*Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment.*The amendments eliminate Step 2 from the goodwill impairment test. The annual, or interim, goodwill impairment test is performed by comparing the fair value of a reporting unit to its carrying amount. An impairment charge should be recognized for the amount by which the carrying amount exceeds the reporting unit’s fair value; however, the loss recognized should not exceed the total amount of goodwill allocated to that reporting unit. In addition, income tax effects from any tax-deductible goodwill on the carrying amount of the reporting unit should be considered when measuring the goodwill impairment loss, if applicable. The amendments eliminate the requirements for any reporting unit with a zero or negative carrying amount to perform a qualitative assessment, and if it fails that qualitative test, to perform Step 2 of the goodwill impairment test. An entity still has the option to perform the qualitative assessment for a reporting unit to determine if the quantitative impairment test is necessary. We adopted the standard in the first quarter of 2020 using a prospective approach. The adoption required certain additional disclosures but had no impact on our unaudited condensed consolidated financial statements.

In August 2018, the FASB issued ASU 2018-13,*Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement.* The primary focus of the standard is to improve the effectiveness of the disclosure requirements for fair value measurements. The changes affect all companies that are required to include fair value measurement disclosures. The standard requires the use of the prospective method of transition for disclosures related to changes in unrealized gains and losses, the range and weighted average of significant unobservable inputs used to develop fair value measurements categorized within Level 3 of the fair value hierarchy, and narrative description of measurement uncertainty. All other amendments in the standard are required to be adopted retrospectively. We adopted the standard in the first quarter of 2020 and the adoption had no impact on our unaudited condensed consolidated financial statements and related disclosures.

In November 2018, the FASB issued ASU 2018-18,*Collaborative Arrangements (Topic 808): Clarifying the Interaction Between Topic 808 and Topic 606.* ASU 2018-18 provides guidance on how to assess whether certain transactions between collaborative arrangement participants should be accounted for within the revenue recognition standard. The standard also provides more comparability in the presentation of revenue for certain transactions between collaborative arrangement participants. The standard is to be applied retrospectively to the date of the initial application of Topic 606 which also requires recognition of the cumulative effect of applying the amendments as an adjustment to the opening balance of retained earnings of the later or the earliest annual period presented and the annual period inclusive of the initial application of Topic 606. We adopted the standard in the first quarter of 2020. The adoption will adjust certain annual disclosures but had no impact on our unaudited condensed consolidated financial statements and related disclosures.

Recently issued accounting pronouncements not yet adopted

From time to time, new accounting pronouncements are issued by the FASB or other standards setting bodies that are adopted by us as of the specified effective date. Unless otherwise discussed, we believe that the impact of recently issued standards that are not yet effective will not have a material impact on our unaudited condensed consolidated financial statements upon adoption.

In December 2019, the FASB issued ASU 2019-12, Income Taxes (Topic 740):*Simplifying the Accounting for Income Taxes which is intended to simplify various aspects related to accounting for income taxes*. The standard is effective for fiscal years, and interim periods within those years, beginning after December 15, 2020, with early adoption permitted. The standard will be adopted upon the effective date for us beginning January 1, 2021. We are currently evaluating the effects of the standard on our consolidated financial statements and related disclosures.

In March 2020, the FASB issued ASU 2020-04, Reference Rate Reform (Topic 848):*Facilitation of the Effects of Reference Rate Reform on Financial Reporting.*The standard provides optional expedients and exceptions for applying GAAP to contracts, hedging relationships, and other transactions in which the reference LIBOR or another reference rate are expected to be discontinued as a result of the Reference Rate Reform. The standard is effective for all entities. The standard may be adopted as of any date from the beginning of an interim period that includes or is subsequent to March 12, 2020 through December 31, 2022. We are currently evaluating the effects of the standard on our consolidated financial statements and related disclosures.

In May 2020, the Securities and Exchange Commission formally adopted amendments to financial disclosure regulations regarding the acquisition and disposition of certain business and among other things, amends the definition of a “significant subsidiary” by altering prescribed significance tests under Rule 1-02(w) of Regulation S-X, as well as under Rule 405 of the Securities Act of 1933 and Rule 12b-2 under the Securities Exchange Act of 1934. The amendments apply to reports and information filings as of January 1, 2021, with early adoption permitted. The effect of adoption will adjust certain annual disclosures but we expect no impact on our consolidated financial statements.

Note 3. Revenue Recognition

Disaggregation of Revenue

The following table provides information about disaggregated revenue from contracts with customers into the nature of the products and services and geographic regions, and includes a reconciliation of the disaggregated revenue with reportable segments. The geographic regions that are tracked are the Americas (United States, Canada and Latin America), EMEA (Europe, Middle East and Africa), and APAC (Australia, New Zealand, Southeast Asia and China).

Segment information is as follows (in thousands):

	Three months ended June 30, 2020			Three months ended June 30, 2019		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Major products and service:						
Product Revenue	$ 4,504	$ —	$ 4,504	$ 6,249	$ —	$ 6,249
Research and development revenue	3,002	7,461	10,463	4,340	1,730	6,070
Total revenues	$ 7,506	$ 7,461	$ 14,967	$ 10,589	$ 1,730	$ 12,319
Primary geographical markets:						
Americas	$ 1,173	$ 5,733	$ 6,906	$ 4,076	$ —	$ 4,076
EMEA	1,586	1,728	3,314	3,011	1,730	4,741
APAC	4,747	—	4,747	3,502	—	3,502
Total revenues	$ 7,506	$ 7,461	$ 14,967	$ 10,589	$ 1,730	$ 12,319

	Six months ended June 30, 2020			Six months ended June 30, 2019		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Major products and service:						
Product revenue	$ 9,604	$ —	$ 9,604	$ 14,236	$ —	$ 14,236
Research and development revenue	8,775	11,258	20,033	6,440	7,225	13,665
Total revenues	$ 18,379	$ 11,258	$ 29,637	$ 20,676	$ 7,225	$ 27,901
Primary geographical markets:						
Americas	$ 4,171	$ 7,960	$ 12,131	$ 6,913	$ —	$ 6,913
EMEA	5,987	3,298	9,285	5,241	7,225	12,466
APAC	8,221	—	8,221	8,522	—	8,522
Total revenues	$ 18,379	$ 11,258	$ 29,637	$ 20,676	$ 7,225	$ 27,901

Contract Balances

The following table presents balances of contract assets, unbilled receivables, contract costs, and contract liabilities (in thousands):

	June 30, 2020	December 31, 2019
Contract Assets	$ —	$ 1,027
Unbilled receivables	$ 12,412	$ 10,099
Contract Costs	$ 172	$ —
Contract Liabilities: Deferred Revenue	$ 5,045	$ 2,044

We had no asset impairment charges related to contract assets in the three and six months ended June 30, 2020 and 2019.

During the six months ended June 30, 2020, decreases in contract assets were primarily due to contract assets that were subsequently invoiced as our right to consideration for goods and services became unconditional. Increases in unbilled receivables were primarily due to the timing of billings. The increase in deferred revenue were primarily due to cash advances received in excess of revenue recognized.

During the three and six months ended June 30, 2020 and 2019, we recognized the following revenues (in thousands):

	Three months ended June 30,		Six months ended June 30,	
	2020	2019	2020	2019
Amounts included in contract liabilities at the beginning of the period:				
Performance obligations satisfied	$ 4,272	$ 1,367	$ 57	$ 3,752
Changes in the period:				
Changes in the estimated transaction price allocated to performance obligations satisfied in prior periods	1,357	(92)	637	43
Performance obligations satisfied from new activities in the period - contract revenue	9,338	11,044	28,943	24,106
Total revenues	$ 14,967	$ 12,319	$ 29,637	$ 27,901

Performance Obligations

The following table includes estimated revenue expected to be recognized in the future related to performance obligations that are unsatisfied or partially unsatisfied at the end of the reporting periods. The estimated revenue does not include contracts with original durations of one year or less, amounts of variable consideration attributable to royalties, or contract renewals that are unexercised as of June 30, 2020.

The balances in the table below are partially based on judgments involved in estimating future orders from customers subject to the exercise of material rights pursuant to respective contracts (in thousands):

	Remainder of 2020	2021	2022 and Thereafter	Total
Product Revenue	$ 567	$ 385	$ 1,883	$ 2,835
Research and development revenue	1,107	624	479	2,210
Total revenues	$ 1,674	$ 1,009	$ 2,362	$ 5,045

Note 4. Net loss per Share

Basic net loss per share is computed by dividing the net loss by the weighted-average number of shares of common stock outstanding, less restricted stock awards ("RSAs") subject to forfeiture. Diluted net loss per share is computed by dividing net loss by the weighted-average number of shares of common stock outstanding, less RSAs subject to forfeiture, plus all additional common stock shares that would have been outstanding, assuming dilutive potential common stock shares had been issued for other dilutive securities. For periods of net loss, diluted and basic net loss per share are identical since potential common stock shares are excluded from the calculation, as their effect was anti-dilutive.

Anti-Dilutive Securities

In periods of net loss, the weighted average number of shares outstanding, prior to the application of the treasury stock method, excludes potentially dilutive securities from the computation of diluted net loss per common share because including such shares would have an anti-dilutive effect. The following shares were not included in the computation of diluted net loss per share (in thousands):

	Three months ended June 30,		Six months ended June 30,	
	2020	2019	2020	2019
Shares issuable under the Equity Incentive Plan	5,289	6,254	5,289	6,254

Note 5. Collaborative Arrangements

GSK Platform Technology Transfer, Collaboration and License Agreement

In July 2014, we entered into a CodeEvolver® protein engineering platform technology transfer collaboration and license agreement (the "GSK CodeEvolver® Agreement") with GlaxoSmithKline ("GSK"). Pursuant to the terms of the agreement, we granted GSK a non-exclusive license to use the CodeEvolver® protein engineering platform technology to develop novel enzymes for use in the manufacture of GSK's pharmaceutical and health care products.

We received an upfront fee upon the execution of the agreement in July 2014 and milestone payments in each of the years from 2014 through April 2016. We completed the transfer of the CodeEvolver® protein engineering platform technology to GSK in April 2016 and all revenues relating to the technology transfer have been recognized as of April 2016. We have the potential to receive additional cumulative contingent payments that range from $5.75 million to $38.5 million per project based on GSK's successful application of the licensed technology. We are also eligible to receive royalties based on net sales of GSK's sales of licensed enzyme products that are currently not being recognized.

In 2019, we received a $2.0 million milestone payment on the advancement of an enzyme developed by GSK using our CodeEvolver® protein engineering platform technology. We recognized no research and development revenue for the three and six months ended June 30, 2020 and 2019.

Merck Platform Technology Transfer and License Agreement

In August 2015, we entered into a CodeEvolver® platform technology transfer collaboration and license agreement (the "Merck CodeEvolver® Agreement") with Merck, Sharp & Dohme ("Merck") which allows Merck to use the CodeEvolver® protein engineering technology platform in the field of human and animal healthcare.

We received an up-front license fee upon execution of the Merck CodeEvolver® Agreement, and milestone payments in September 2015 and in September 2016, when we completed the transfer of the engineering platform technology. We recognized research and development revenues $0.2 million and $1.0 million for the three and six months ended June 30, 2020, respectively, compared to $1.0 million and $2.0 million for the three and six months ended June 30, 2019, respectively, for various research projects under our collaborative arrangement.

We have the potential to receive payments of up to a maximum of $15.0 million for each commercial active pharmaceutical ingredient ("API") that is manufactured by Merck using one or more novel enzymes developed by Merck using the CodeEvolver® protein engineering technology platform. The API payments, which are currently not recognized in revenue, are based on the quantity of API developed and manufactured by Merck and will be recognized as usage-based royalties.

In January 2019, we entered into an amendment to the Merck CodeEvolver® Agreement to install certain CodeEvolver® protein engineering technology upgrades into Merck's platform license installation and maintain those upgrades for a multi-year term. The license installation was completed in 2019 and we recognized $0.9 million in the three and six months ended June 30, 2019 as a license fee revenue accordingly under the amendment. Pursuant to the agreement, Merck has options to future technology enhancements for a specified fee. As of June 30, 2020, Merck has not exercised its option for technology enhancements. We recognized $25 thousand and $50 thousand in research and development revenues under the terms of the amendment in the three and six months ended June 30, 2020, respectively. As of June 30, 2020 and December 31, 2019, we had deferred revenue balances of $0.1 million and nil, respectively.

Merck Sitagliptin Catalyst Supply Agreement

In February 2012, we entered into a five-year Sitagliptin Catalyst Supply Agreement ("Sitagliptin Catalyst Supply Agreement") with Merck whereby Merck may obtain commercial scale enzyme for use in the manufacture of Januvia®, its product based on the active ingredient sitagliptin. In December 2015, Merck exercised its option under the terms of the sitagliptin Catalyst Supply Agreement to extend the agreement for an additional five years through February 2022.

Effective as of January 2016, we and Merck amended the Sitagliptin Catalyst Supply Agreement to prospectively provide for variable pricing based on the cumulative volume of sitagliptin catalyst purchased by Merck and to allow Merck to purchase a percentage of its requirements for sitagliptin catalyst from a specified third-party supplier. Merck received a distinct, functional license to manufacture a portion of its demand beginning January 1, 2018, which we recognized as research and development revenue.

We have determined that the variable pricing, which provides a discount based on the cumulative volume of sitagliptin catalyst purchased by Merck, provides Merck material rights and we are recognizing product revenues using the alternative method. Under the alternative approach, we estimate the total expected consideration and allocate it proportionately with the expected sales.

The Sitagliptin Catalyst Supply Agreement requires Merck to pay an annual fee for the rights to the sitagliptin technology each year for the term of the Sitagliptin Catalyst Supply Agreement. Amounts of annual license fees are based on contractually agreed prices and are on a declining scale over the term of the contract.

Pursuant to the terms of the Sitagliptin Catalyst Supply Agreement, Merck may purchase supply from us for a fee based on contractually stated prices. Deferred revenues were offset against contract assets where the right of offset exists within the contract. We recognized revenue of $2.0 million and $3.8 million for the three and six months ended June 30, 2020, respectively, compared to $2.5 million and $7.8 million in the three and six months ended June 30, 2019, respectively, in product revenue under this agreement. As of June 30, 2020 and December 31, 2019, we had deferred revenue balances related to the Sitagliptin Catalyst Supply Agreement of $0.3 million and nil, respectively.

Enzyme Supply Agreement

In November 2016, we entered into a supply agreement whereby our customer may purchase quantities of one of our proprietary enzymes for use in its commercial manufacture of a product. Pursuant to the supply agreement, we received an upfront payment in December 2016 which was recorded as deferred revenues. Such upfront payment will be recognized over the period of the supply agreement as the customer purchases our proprietary enzyme. We additionally have determined that the volume discounts under the supply agreement provides the customer material rights and we are recognizing revenues using the alternative method. As of June 30, 2020 and December 31, 2019, we had deferred revenue balances from the supply agreement of $2.0 million.

Global Development, Option and License Agreement, Strategic Collaboration Agreement, and Development Agreement

In October 2017, we entered into a Global Development, Option and License Agreement (the “Nestlé Agreement”) with Société des Produits Nestlé (formerly known as Nestec Ltd.) (“Nestlé Health Science”) and, solely for the purpose of the integration and the dispute resolution clauses of the Nestlé Agreement, Nestlé Health Science S.A., to advance CDX-6114, our enzyme biotherapeutic product candidate for the potential treatment of PKU.

We received an upfront cash payment of $14.0 million in 2017 upon the execution of the Nestlé Agreement, a $4.0 million milestone payment after dosing the first subjects in a first-in-human Phase 1a dose-escalation trial with CDX-6114, and a $1.0 million milestone payment upon achievement of a milestone relating to formulation of CDX-6114. The $4.0 million milestone payment that was triggered by the initiation of the trial was received in 2018 and the $1.0 million milestone payment that was triggered by the achievement of a formulation relating to CDX-6114 was received in February 2019. The upfront payment and the variable consideration relating to the progress payment of $4.0 million and milestone payment of $1.0 million were recognized over time as the development work was performed. Revenue was recognized using a single measure of progress that depicted our performance in transferring control of the services, which was based on the ratio of level of effort incurred to date compared to the total estimated level of effort required to complete all performance obligations under the agreement. We recognized nominal research and development revenue for the three and six months ended June 30, 2020, respectively, compared to $0.5 million and $1.7 million for the three and six months ended June 30, 2019, respectively.

In January 2019, we received notice from the FDA that it had completed its review of our investigational new drug application ("IND") for CDX-6114 and concluded that we may proceed with the proposed Phase 1b multiple ascending dose study in healthy volunteers in the United States. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive, worldwide, royalty-bearing, sub-licensable license for the global development and commercialization of CDX-6114 for the management of PKU and paid us $3.0 million which we recognized as research and development revenue in 2019. Upon exercising its option, Nestlé Health Science assumed all responsibilities for future clinical development and commercialization of CDX-6114, with the exception of the completion of an extension study, CDX-6114-004, which was substantially completed in the fourth quarter of 2019. Other potential payments from Nestlé Health Science to us under the Nestlé Agreement include (i) development and approval milestones of up to $85.0 million, (ii) sales-based milestones of up to $250.0 million in the aggregate, which aggregate amount is achievable if net sales exceed $1.0 billion in a single year, and (iii) tiered royalties, at percentages ranging from the middle single digits to low double-digits, of net sales of product.

In October 2017, we also entered into a Strategic Collaboration Agreement (the "Strategic Collaboration Agreement") with Nestlé Health Science pursuant to which we and Nestlé Health Science are collaborating to leverage the CodeEvolver® protein engineering technology platform to develop novel enzymes for Nestlé Health Science's established Consumer Care and Medical Nutrition business areas. Under the Strategic Collaboration Agreement, we received an upfront payment of $1.2 million in 2017 and an incremental payment of $0.6 million in September 2018 for additional services. The Strategic Collaboration Agreement has been extended through December 2021.

In January 2020, we entered into a development agreement with Nestlé Health Science pursuant to which we and Nestlé Health Science are collaborating to advance a lead candidate targeting a gastro-intestinal disorder discovered through our Strategic Collaboration Agreement into pre-clinical and early clinical studies.

We recognized research and development fees of $1.7 million and $3.3 million for the three and six months ended June 30, 2020, respectively, compared to $1.2 million and $2.5 million in the three and six months ended June 30, 2019, respectively.

Strategic Collaboration Agreement

In April 2018, we entered into the Porton Agreement with Porton to license key elements of our biocatalyst technology for use in Porton's global custom intermediate and API development and manufacturing business. Under the Porton Agreement, we are eligible to receive annual collaboration fees and research and development revenues. We received an initial collaboration fee of $0.5 million within 30 days of the effective date of the Porton Agreement, $1.5 million upon the first anniversary of the effective date of the agreement. In the second quarter of 2020, we recognized $1.0 million in research and development revenue on the second anniversary of the effective date of the agreement. We are eligible to receive $1.0 million on the third anniversary of the effective date of the agreement. We completed the technical transfer in the fourth quarter of 2018 and recognized $2.8 million in research and development revenue. We recognized revenue related to the functional license provided to Porton at a point in time when control of the license was transferred to the customer. We recognized research and development revenue related to the Porton Agreement of $1.0 million and $1.1 million in the three and six months ended June 30, 2020, respectively, and no revenue in the three and six months ended June 30, 2019.

Platform Technology Transfer and License Agreement

In May 2019, we entered into a Platform Technology Transfer and License Agreement (the "Novartis CodeEvolver® Agreement") with Novartis Pharma AG ("Novartis"). The Agreement allows Novartis to use our proprietary CodeEvolver® protein engineering platform technology in the field of human healthcare. Under the Novartis CodeEvolver® Agreement, we are transferring our proprietary CodeEvolver® protein engineering platform technology to Novartis over approximately 23 months, starting with the date on which we commenced the technology transfer (the "Technology Transfer Period"). As a part of this technology transfer, the Company provided to Novartis our proprietary enzymes, proprietary protein engineering protocols and methods, and proprietary software algorithms. In addition, teams of the Company and Novartis scientists participated in technology training sessions and collaborative research projects at the our laboratories in Redwood City, California and at a designated Novartis laboratory in Basel, Switzerland. Upon completion of technology transfer, Novartis will have the CodeEvolver® protein engineering platform technology installed at its designated laboratory.

Pursuant to the agreement, we received an upfront payment of $5.0 million shortly after the effective date of the Novartis CodeEvolver® Agreement. In the second quarter of 2020, we completed the second technology milestone transfer under the agreement and became eligible to receive a milestone payment of $4.0 million, which we subsequently received in July 2020. We are eligible to receive an additional $5.0 million upon satisfactory completion of the third technology transfer milestone. In consideration for the continued disclosure and license of improvements to our technology and materials during a multi-year period that begins on the conclusion of the Technology Transfer Period, Novartis will pay us annual payments which amount to an additional $8.0 million. The Company also has the potential to receive quantity-dependent, usage payments for each API that is manufactured by Novartis using one or more enzymes that have been developed or are in development using the CodeEvolver® protein engineering platform technology during the period that begins on the conclusion of the Technology Transfer Period and ends on the expiration date of the last to expire licensed patent. These product-related usage payments, if any, will be paid by Novartis to us for each quarter that Novartis manufactures API using a CodeEvolver®-developed enzyme. The usage payments will be based on the total volume of API produced using the CodeEvolver®-developed enzyme. These usage payments can begin in the clinical stage and will extend throughout the commercial life of each API. Revenue for the combined initial license and technology transfer performance obligation, which is expected to occur over twenty-three months, is being recognized using a single measure of progress that depicts our performance in transferring control of the services, which is based on the ratio of level of effort incurred to date compared to the total estimated level of effort required to complete the performance obligation relating to the combined initial license and technology transfer. Revenue allocated to future improvements will be recognized during the Improvement Term. We recognized $0.9 million and $3.7 million in research and

development revenue for the three and six months ended June 30, 2020, respectively andno revenue in the three and six months ended June 30, 2019 from the Novartis CodeEvolver® Agreement.

License Agreement

In December 2019, we entered a license agreement with Roche Sequencing Solutions, Inc. ("Roche") to provide Roche with our EvoT4 DNA™ ligase high-performance molecular diagnostic enzyme. The royalty bearing license grants Roche worldwide rights to include the EvoT4 DNA™ ligase in its nucleic acid sequencing products and workflows. Under the license agreement, we received an initial collaboration fee payment within 45 days of the effective date of the agreement and we are eligible to receive an additional milestone within 60 days after the completion of technology transfer. The agreement also contemplates milestone payments to the Company upon the achievement of various development and commercialization events and royalty payments from commercial sales of the enzyme. We recognized research and development fees of $0.2 million and $0.8 million for the three and six months ended June 30, 2020, respectively.

Strategic Collaboration and License Agreement

In March 2020, we entered into a Strategic Collaboration and License Agreement (the "Takeda Agreement") with Shire Human Genetic Therapies, Inc., a wholly-owned subsidiary of Takeda Pharmaceutical Co. Ltd. ("Takeda") under which we will research and develop protein sequences for use in gene therapy products for certain diseases (each, a "Field") in accordance with each applicable program plan (each, a "Program Plan").

In March 2020, we received an up-front nonrefundable cash payment of $8.5 million and we initiated activities under three Program Plans for Fabry Disease, Pompe Disease, and an unnamed blood factor deficiency respectively (the "Initial Programs"). We are primarily responsible for the research and development of protein sequences under the Program Plans (the "Protein Sequences") and we are eligible to receive up to $22.3 million of research and development fees and pre-clinical milestone payments for the Initial Programs. Takeda has the right, but not the obligation, to develop, manufacture and commercialize gene therapy products that include nucleic acid sequences that encode the Protein Sequences ("Products") at their expense. Takeda has the right to a certain number of additional disease indications ("Reserved Target Indications") for a limited period in which Takeda may initiate a Program Plan for one or more Reserved Target Indications ("Additional/Option Program," with Initial Programs, the "Programs"), provided, (a) if Takeda elects to initiate an Additional/Option Program while the parties are collaborating on three other Programs at the time of such election, or (b) if Takeda elects to initiate an Additional/Option Program using the last remaining Reserved Target Indication, then Takeda must pay us an option exercise fee to initiate such Additional/Option Program. We will own all rights to the Protein Sequences and corresponding nucleic acid sequences and related intellectual property rights and Takeda will own all rights to Products and related intellectual property rights.

We granted to Takeda an exclusive, worldwide, royalty-bearing, sublicensable license to use the Protein Sequences and their corresponding nucleic acid sequences to develop, manufacture and commercialize the applicable Products in the applicable Field. We also granted to Takeda a limited non-exclusive, worldwide, sublicensable license (a) to research the Protein Sequences within or outside the applicable Fields and (b) to research the Products outside of the applicable Fields, which such rights exclude Takeda's right to perform any Investigational New Drug-enabling activities. The licenses to research the Protein Sequences expire after a pre-determined period of time.

The term of the Takeda Agreement begins on the Effective Date and continues on a Product-by-Product and country-by-country basis, until the expiration of Takeda's obligation to pay royalties to the Company with respect to that Product in that country. The Takeda Agreement expires in its entirety upon the expiration of Takeda's obligation to pay royalties to the Company with respect to the Products in all countries worldwide. Subject to the terms of the Takeda Agreement, and after the first anniversary of the Effective Date with respect to the Initial Programs or after the first anniversary of confirmation of the applicable Program Plan by the parties with respect to the Additional/Option Programs, Takeda may terminate a Program upon specified prior written notice to the Company. Subject to the terms of the Takeda Agreement, Takeda may terminate the Takeda Agreement, at will, on a Product-by-Product basis upon specified prior written notice to the Company and the Takeda Agreement in its entirety upon specified prior written notice to the Company. Subject to the terms of the Takeda Agreement, Takeda may terminate the Takeda Agreement on a Product-by-Product basis for safety reasons upon specified prior written notice to the Company. Either party may terminate the Takeda Agreement for an uncured material breach by the other party, or the other party's insolvency or bankruptcy.

We are eligible to receive certain development and commercialization milestone payments up to $100.0 million per target gene, the modulation of which would lead to the treatment of the disease indications by the applicable Product. We are also eligible to receive tiered royalties based on net sales of Products at percentages ranging from the middle-single digits to low single-digits. We recognized research and development revenue related to the Takeda Agreement of $5.7 million and $8.0 million in the three and six months ended June 30, 2020, respectively. As of June 30, 2020, we had a deferred revenue balance of $2.2 million from Takeda.

Master Collaboration and Research Agreement and Stock Purchase Agreement

In June 2020, we entered into a Stock Purchase Agreement with Molecular Assemblies, Inc. ("MAI") pursuant to which we purchased1,587,050 shares of MAI's Series A preferred stock for $1.0 million in connection with the transaction, our chief executive officer, John Nicols, also joined MAI's board of directors.

At the same time, we entered into a Master Collaboration and Research Agreement (the "MAI Agreement") with MAI to engineer DNA polymerase enzymes to deliver differentiated and cost-effective solutions for the enzymatic synthesis of DNA. Under the MAI Agreement and its related statement of work ("SOW"), we will apply our CodeEvolver® protein engineering platform technology to improve the DNA polymerase enzymes that are critical for enzymatic DNA synthesis. Based on these services, the Company is eligible to earn additional shares of MAI's Series A preferred stock. MAI will combine its advanced chemistries with our enzymes to drive the process to commercialization. Under the MAI Agreement and its associated SOW, we will engage in research and development activities to engineer DNA polymerase enzymes for the enzymatic synthesis of DNA in exchange for monthly fees in the form of shares of Series A preferred stock in MAI. We are eligible to earn such non-monetary payments over ten to thirteen months, and any such shares would be issuedthirty days in arrears after each calendar quarter-end. We are also eligible to receive amounts for bonuses, targets and milestones on achievement of timeline and project goals specified in the SOW. Payments for bonuses, targets and milestones on achievement of timeline and project goals are to be issued thirty days after the Company provides notification of completion. Under the MAI Agreement, the Company will have the right to use and sell the engineered enzymes to third parties for any purpose other than for the synthesis of native DNA. Under the MAI Agreement, we would make a $0.5 million payment to MAI upon our achievement of a milestone of $5.0 million in aggregate commercial sales to third parties of the engineered enzymes or any product incorporating or derived from the engineered enzymes for any purpose other than the synthesis of native DNA. The MAI Agreement contemplates that we and MAI will enter into a Commercialization and Enzyme Supply Agreement (the "CESA") within six months following the completion of certain timelines specified in the SOW. In addition, we and MAI have agreed pursuant to the MAI Agreement to certain terms to be contained within the CESA in the event that the CESA becomes executed in the future. Those include: (a) that MAI would receive an exclusive license to use the DNA polymerase enzymes engineering by us under the MAI Agreement in the synthesis of native DNA and a non-exclusive license to use these enzymes for research and development on the synthesis of non-native DNA, and (b) we would become the exclusive manufacturer of these enzymes for MAI, its affiliates and licensees.

We recognized no research and development revenue in the three and six months ended June 30, 2020 from transactions with MAI.

Note 6. Cash Equivalents and Equity Securities

Cash equivalents at June 30, 2020 and December 31, 2019 consisted of the following (in thousands):

	June 30, 2020		December 31, 2019	
	Adjusted Cost	Estimated Fair Value	Adjusted Cost	Estimated Fair Value
Money market funds [1]	$ 58,482	$ 58,482	$ 71,248	$ 71,248

[1] Money market funds are classified in cash and cash equivalents on our unaudited condensed consolidated balance sheets.

As of June 30, 2020, the total cash and cash equivalents balance of $75.6 million was comprised of money market funds of $58.5 million and cash of $17.1 million held with major financial institutions worldwide. As of December 31, 2019, the total cash and cash equivalents balance of $90.5 million was comprised of money market funds of $71.2 million and cash of $19.3 million held with major financial institutions worldwide.

Investment in Equity Securities

No single investor in MAI holds 20% or more of the voting stock. Our investment represented approximately4% of MAI's voting stock at the time of the transaction. Concurrently with our initial equity investment, John Nicols, our chief executive officer, joined MAI's board of directors, and we entered into the MAI Agreement pursuant to which we will provide technical services and expertise in exchange for compensation in the form of additional shares of voting preferred stock. Our investment was $1.0 million at June 30, 2020. For additional information, see Note 12, ″Related Party Transactions."

Note 7. Fair Value Measurements

The following tables present the financial instruments that were measured at fair value on a recurring basis at June 30, 2020 and December 31, 2019 by level within the fair value hierarchy (in thousands):

	June 30, 2020			
	Level 1	Level 2	Level 3	Total
Money market funds	$ 58,482	$ —	$ —	$ 58,482

	December 31, 2019			
	Level 1	Level 2	Level 3	Total
Money market funds	$ 71,248	$ —	$ —	$ 71,248

Note 8. Balance Sheets Details

Inventories

Inventories consisted of the following (in thousands):

	June 30, 2020	December 31, 2019
Raw materials	$ 77	$ 7
Work-in-process	28	26
Finished goods	581	338
Inventories	$ 686	$ 371

Property and Equipment, net

Property and equipment, net consisted of the following (in thousands):

	June 30, 2020	December 31, 2019
Laboratory equipment	$ 24,717	$ 23,561
Leasehold improvements	10,774	10,804
Computer equipment and software	3,135	3,016
Office equipment and furniture	1,115	1,461
Construction in progress	648	691
Property and equipment	40,389	39,533
Less: accumulated depreciation and amortization	(33,567)	(33,251)
Property and equipment, net	$ 6,822	$ 6,282

Goodwill

Goodwill had a carrying value of approximately $3.2 million as of June 30, 2020 and December 31, 2019.

Other Accrued Liabilities

Other accrued liabilities consisted of the following (in thousands):

	June 30, 2020	December 31, 2019
Accrued purchases	$ 3,669	$ 4,386
Accrued professional and outside service fees	2,949	1,802
Other	325	352
Total	$ 6,943	$ 6,540

Note 9. Stock-based Compensation

Equity Incentive Plans

In June 2019, our board of directors (the "Board") and stockholders approved the 2019 Incentive Award Plan (the "2019 Plan"). The 2019 Plan superseded and replaced in its entirety our 2010 Equity Incentive Plan (the “2010 Plan”) which was effective in March 2010, and no further awards will be granted under the 2010 Plan; however, the terms and conditions of the 2010 Plan will continue to govern any outstanding awards thereunder.

The 2010 Plan provided for the grant of incentive stock options, non-statutory stock options, restricted stock units ("RSUs"), restricted stock awards ("RSAs"), performance-contingent restricted stock units ("PSUs"), performance based options ("PBOs"), stock appreciation rights, and stock purchase rights to our employees, non-employee directors and consultants.

The number of shares of our common stock available for issuance under the 2019 Plan is equal to the sum of (i)7,897,144 shares, and (ii) any shares subject to awards granted under the 2010 Plan that were outstanding as of April 22, 2019 and thereafter terminate, expire, lapse or are forfeited; provided that no more than 14,000,000 shares may be issued upon the exercise of incentive stock options (“ISOs”). In June 2019, 8.1 million shares authorized for issuance under the 2019 Plan were registered under the Securities Act of 1933, as amended (the “Securities Act”).

The 2019 Plan provides for the grant of stock options, including incentive stock options and non-qualified stock options, stock appreciation rights, restricted stock, restricted stock units, other stock or cash based awards and dividend equivalents to eligible employees and consultants of the Company or any parent or subsidiary, as well as members of the Board.

Stock Options

The option exercise price for incentive stock options must be at least100% of the fair value of our common stock on the date of grant and the option exercise price for non-statutory stock options is 85% of the fair value of our common stock on the date of grant, as determined by the Board. If, at the time of a grant, the optionee directly or by attribution owns stock possessing more than 10% of the total combined voting power of all of our outstanding capital stock, the exercise price for these options must be at least 110% of the fair value of the underlying common stock. Stock options granted to employees generally have a maximum term of10 years and vest over four years from the date of grant, of which 25% vest at the end of one year, and 75% vest monthly over the remaining three years. We may grant options with different vesting terms from time to time. Unless an employee's termination of service is due to disability or death, upon termination of service, any unexercised vested options will be forfeited at the end of three months or the expiration of the option, whichever is earlier.

Restricted Stock Units (RSUs)

We also grant employees RSUs, which generally vest over either a three year period with one-third of the shares subject to the RSUs vesting on each yearly anniversary of the vesting commencement date or over a four year period with 25% of the shares subject to the RSU vesting on each yearly anniversary of the vesting commencement date, in each case contingent upon such employee's continued service on such vesting date. RSUs are generally subject to forfeiture if employment terminates prior to the release of vesting restrictions. We may grant RSUs with different vesting terms from time to time.

Performance-contingent Restricted Stock Units (PSUs) and Performance Based Options (PBOs)

We also grant our executives and our non-executive employees PSUs, and we grant our executives PBOs. The PSUs and PBOs vest based upon both the successful achievement of certain corporate operating milestones in specified timelines and continued employment through the applicable vesting date. When the performance goals are deemed to be probable of achievement for these types of awards, recognition of stock-based compensation expense commences. Once the number of shares eligible to vest is determined, those shares vest in two equal installments with 50% vesting upon achievement and the remaining 50% vesting on the first anniversary of achievement, in each case, subject to the recipient's continued service through the applicable vesting date. If the performance goals are achieved at the threshold level, the number of shares eligible to vest in respect of the PSUs and PBOs would be equal to half the number of PSUs granted and one-quarter the number of shares underlying the PBOs granted. If the performance goals are achieved at the target level, the number of shares eligible to vest in respect of the PSUs and PBOs would be equal to the number of PSUs granted and half of the shares underlying the PBOs granted. If the performance goals are achieved at the superior level, the number of shares eligible to vest in respect of the PSUs would be equal to two times the number of PSUs granted and equal to the number of PBOs granted. The number of shares issuable upon achievement of the performance goals at the levels between the threshold and target levels for the PSUs and PBOs or between the target level and superior levels for the PSUs would be determined using linear interpolation. Achievement below the threshold level would result in no shares being eligible to vest in respect of the PSUs and PBOs.

In the first quarter of 2020, we awarded PSUs ("2020 PSUs") and PBOs ("2020 PBOs"), each of which commence vesting based upon the achievement of various weighted performance goals, including sustained revenue and performance enzyme growth, strategic advancements of biotherapeutics pipeline, safety and technology development. As of June 30, 2020, we estimated that the 2020 PSUs and 2020 PBOs performance goals would be achieved at 100% of the target level, and recognized expenses accordingly.

In 2019, we awarded PSUs ("2019 PSUs") and PBOs ("2019 PBOs"), each of which commenced vesting based upon the achievement of various weighted performance goals, including sustained revenue and performance enzyme growth, strategic advancement of biotherapeutics, cash balance and strategic plan development. In the first quarter of 2020, we determined that the 2019 PSUs and 2019 PBOs performance goals had been achieved at 106% of the target level, and recognized expenses accordingly. Accordingly, 50% of the shares underlying the 2019 PSUs and PBOs vested in the first quarter of 2020 and50% of the shares underlying the 2019 PSUs and PBOs will vest in the first quarter of 2021, in each case subject to the recipient's continued service on each vesting date.

In 2018, we awarded PSUs ("2018 PSUs") and PBOs ("2018 PBOs"), each of which commenced vesting based upon the achievement of various weighted performance goals, including core business revenue growth, cash balance, new licensing collaborations, new research and development service revenue arrangements, technology advancement and novel therapeutic enzymes advancement. In the first quarter of 2019, we determined that the 2018 PSUs and 2018 PBOs performance goals had been achieved at 118% of the target level, and recognized expenses accordingly. Accordingly, 50% of the shares underlying the 2018 PSUs and PBOs vested in the first quarter of 2019 and 50% of the shares underlying the 2018 PSUs and PBOs vested in the first quarter of 2020, in each case subject to the recipient's continued service on each vesting date.

Stock-Based Compensation Expense

Stock-based compensation expense is included in the unaudited condensed consolidated statements of operations as follows (in thousands):

	Three Months Ended June 30,		Six months ended June 30,	
	2020	**2019**	**2020**	**2019**
Research and development	$ 471	$ 403	$ 894	$ 791
Selling, general and administrative	1,468	1,585	3,214	3,260
Total	$ 1,939	$ 1,988	$ 4,108	$ 4,051

The following table presents total stock-based compensation expense by security type included in the unaudited condensed consolidated statements of operations for the three and six months ended June 30, 2020 and 2019 (in thousands):

	Three Months Ended June 30,		Six months ended June 30,	
	2020	2019	2020	2019
Stock options	$ 575	$ 581	$ 1,116	$ 1,135
RSUs and RSAs	610	386	1,210	847
PSUs	296	316	627	707
PBOs	458	705	1,155	1,362
Total	$ 1,939	$ 1,988	$ 4,108	$ 4,051

In June 2020, we granted an option to purchase 60,000 shares of common stock to a non-employee as compensation for services. The estimated fair value of the grant was valued at $0.3 million using the Black-Scholes-Merton option pricing model with the following assumptions used to estimate the fair value of non-employee stock options: (i) volatility rate at 51.9%, (ii) risk-free interest rate of 0.4% and (iii) no expected dividend yield. The option vests over 2 years from the date of grant with 50% vesting after one year and the remaining 50% vesting monthly in the second year. We recognized stock-based compensation expense related to the non-employee of $4 thousand for the three and six months ended June 30, 2020.

As of June 30, 2020, unrecognized stock-based compensation expense, net of expected forfeitures, was $4.8 million related to unvested employee stock options, $0.2 million related to unvested non-employee stock options, $2.7 million related to unvested RSUs and RSAs, $1.1 million related to unvested PSUs, and $1.7 million related to unvested PBOs based on current estimates of the level of achievement. Stock-based compensation expense for these awards will be recognized through the year of 2024.

Note 10. Capital Stock

Exercise of Options

For the six months ended June 30, 2020 and June 30, 2019, we issued 32,749 and 529,187 shares, respectively, upon option exercises at a weighted-average exercise price of $6.03 and $5.37 per share, respectively, with net cash proceeds of $0.2 million and $2.8 million, respectively.

Private Offering

In June 2019, we entered into a Securities Purchase Agreement with an affiliate of Casdin pursuant to which we issued and sold to Casdin 3,048,780 shares of our common stock at a purchase price of $16.40 per share. After deducting legal fees of $74 thousand from the Private Offering, our net proceeds were $49.9 million.

The Private Offering was exempt from registration pursuant to the exemption for transactions by an issuer not involving any public offering under Section 4(a)(2) the Securities Act, and Regulation D under the Securities Act.

Note 11. Commitments and Contingencies

Operating Leases

Our headquarters are located in Redwood City, California, where we occupy approximately 77,300 square feet of office and laboratory space in four buildings within the same business park of Metropolitan Life Insurance Company ("MetLife"). Our lease (“Lease”) with MetLife includes approximately 28,200 square feet of space located at 200 and 220 Penobscot Drive, Redwood City, California (the “Penobscot Space”), approximately 37,900 square feet of space located at 400 Penobscot Drive, Redwood City, California (the “Building 2 Space”), and approximately 11,200 square feet of space located at 501 Chesapeake Drive, Redwood City, California (the “501 Chesapeake Space”).

Until January 31, 2020, we also leased approximately 29,900 square feet of space located at 101 Saginaw Drive, Redwood City, California (the “Saginaw Space”). During the period January 1, 2020 through January 31, 2020, we subleased approximately 26,500 square feet of the Saginaw Space to Minerva Surgical, Inc. The lease and sublease for the Saginaw Space both expired at the end of January 2020. During the period from February 1, 2020 through April 30, 2020, we subleased approximately 3,400 square feet of the Saginaw Space from Minerva Surgical, Inc. The sublease expired at the end of April 2020.

We entered into the initial lease with MetLife for a portion of this space in 2004 and the lease has been amended multiple times since then to adjust space and terms of the lease ("Lease"). In February 2019, we entered into an Eighth Amendment to the Lease (the “Eighth Amendment”) with MetLife with respect to the Penobscot Space, the Building 2 Space and the 501 Chesapeake Space to extend the term of the Lease for additional periods. Pursuant to the Eighth Amendment, the term of the lease of the Penobscot Space and the Building 2 Space has been extended through May 2027. The lease term for the 501 Chesapeake Space has been extended to May 2029. We have two consecutive options to extend the term of the lease for the Penobscot Space, the Building 2 Space and the 501 Chesapeake Space for an additional period of five years per option.

We are required to restore certain areas of the Redwood City facilities that we are renting to their original form. We are expensing the asset retirement obligation over the terms of the respective leases. We review the estimated obligation each reporting period and make adjustments if our estimates change. We recorded asset retirement obligations of $0.2 million as of June 30, 2020 and December 31, 2019, which are included in other liabilities on the unaudited condensed consolidated balance sheets. Accretion expense related to our asset retirement obligations was nominal.

Pursuant to the terms of the Lease, we exercised our right to deliver a letter of credit in lieu of a security deposit. The letter of credit is collateralized by deposit balances held by the bank in the amount of $1.1 million as of June 30, 2020 and December 31, 2019, and are recorded as non-current restricted cash on the unaudited condensed consolidated balance sheets.

Finance Leases

In December 2016, we entered into a three-year financing lease agreement with a third party supplier for the purchase of laboratory equipment that was partially financed through a finance lease of approximately $0.4 million. The lease became effective upon delivery of the equipment in February 2017, and term of the three-year lease was from February 2017 and expired in February 2020. This financing agreement was accounted for as a finance lease due to bargain purchase options at the end of the lease. In April 2017, we entered into a three-year financing lease agreement with a third-party supplier for the purchase of information technology equipment for approximately $0.3 million. The effective term of the three-year lease was from May 2017 and expired in April 2020.

Lease Costs and other information

Lease related costs were as follows (in thousands):

	Three months ended June 30,		Six months ended June 30,	
	2020	2019	2020	2019
Finance lease costs:				
Amortization of right-of-use assets	$ 45	$ 54	$ 99	$ 109
Interest on lease obligations	1	3	1	6
Finance lease costs	46	57	100	115
Operating lease cost	1,032	1,100	2,100	2,278
Short-term lease cost [1]	16	—	47	—
Sublease income	—	(254)	(55)	(465)
Total lease cost	$ 1,094	$ 903	$ 2,192	$ 1,928

[1] Short-term lease costs on leases with terms of over one month and less than one year.

Other information related to non-cancellable finance leases and operating leases under non-cancellable subleases as of June 30, 2020 was as follows:

	Operating Leases
Weighted-average remaining lease term (in years)	7.2 years
Weighted-average discount rate	6.6 %

Cash paid for amounts included in the measurement of lease obligations was as follows (in thousands):

	Six months ended June 30,	
	2020	2019
Operating cash flows from operating leases	$ 774	$ 1,633
Operating cash flows from finance leases	$ —	$ 6
Financing cash flows from finance leases	$ 60	$ 119

As of June 30, 2020, our maturity analysis of annual undiscounted cash flows of the non-cancellable finance and operating leases are as follows (in thousands):

Years ending December 31,	Operating Leases
2020 (remaining 6 months)	$ 2,042
2021	4,197
2022	4,285
2023	4,589
2024	4,726
2025 and thereafter	13,494
Total minimum lease payments	33,333
Less: imputed interest	(7,186)
Lease Obligations	$ 26,147

Other Commitments

We enter into supply and service arrangements in the normal course of business. Supply arrangements are primarily for fixed-price manufacture and supply. Service agreements are primarily for the development of manufacturing processes and certain studies. Commitments under service agreements are subject to cancellation at our discretion which may require payment of certain cancellation fees. The timing of completion of service arrangements is subject to variability in estimates of the time required to complete the work.

The following table provides quantitative data regarding our other commitments. Future minimum payments reflect amounts that we expect to pay including potential obligations under services agreements subject to risk of cancellation by us (in thousands):

Other Commitment Agreement Type	Agreement Date	Future Minimum Payment
Manufacture and supply agreement with expected future payment date of December 2022	April 2016	$ 704
Development and manufacturing services agreements	September 2019	3,785
Strategic Collaboration and License Agreement	March 2020	364
Total other commitments		$ 4,853

Credit Facility

In June 30, 2017, we entered into a credit facility (the “Credit Facility”) consisting of term loans (“Term Debt”) up to $10.0 million, and advances (“Advances”) under a revolving line of credit ("Revolving Line of Credit") up to $5.0 million with an accounts receivable borrowing base of 80% of eligible accounts receivable. At June 30, 2020 and December 31, 2019, we have not drawn from the Credit Facility. We may draw on the Revolving Line of Credit at any time prior to the September 30, 2020 maturity date. On October 1, 2023, loans drawn under the Term Debt mature and the Revolving Line of Credit terminates. Loans made under the Term Debt bears interest through maturity at a variable rate based on the LIBOR plus 3.60%. Advances under the Revolving Line of Credit bear interest at a variable annual rate equal to the greater of (i) 1.00% above the prime rate and (ii) 5.00%.

Our obligations under the Credit Facility are secured by a lien on substantially all of our personal property other than our intellectual property. The Credit Facility includes a number of customary covenants and restrictive financial covenants including meeting minimum product revenue levels and maintaining certain minimum cash levels with the lender. The Credit Facility's financial covenants restrict the ability of the Company to transfer collateral, incur additional indebtedness, engage in mergers or acquisitions, pay dividends or make other distributions, make investments, create liens, sell assets, or sell certain assets held at foreign subsidiaries. A failure to comply with these covenants could permit the lender to exercise remedies against us and the collateral securing the Credit Facility, including foreclosure of our properties securing the Credit Facilities and our cash. At June 30, 2020, we were in compliance with the covenants for the Credit Facility.

The Credit Facility allows for interest-only payments on the Term Debt through November 1, 2021. Monthly payments of principal and interest on the Term Debt are required following the applicable amortization date. We may elect to prepay in full the Term Debt and Advances under the Revolving Line of Credit at any time.

Legal Proceedings

We are not currently a party to any material pending litigation or other material legal proceedings.

Indemnifications

We are required to recognize a liability for the fair value of any obligations we assume upon the issuance of a guarantee. We have certain agreements with licensors, licensees and collaborators that contain indemnification provisions. In such provisions, we typically agree to indemnify the licensor, licensee and collaborator against certain types of third party claims. The maximum amount of the indemnifications is not limited. We accrue for known indemnification issues when a loss is probable and can be reasonably estimated. There were no accruals for expenses related to indemnification issues for any periods presented.

Impact of COVID-19

We are subject to risks and uncertainties as a result of the current COVID-19 pandemic. The COVID-19 pandemic has presented a substantial public health and economic challenge around the world and is affecting our employees, communities and business operations, as well as the U.S. economy and other economies worldwide. The full extent to which the COVID-19 pandemic will directly or indirectly impact our business, results of operations and financial condition will depend on future developments that are highly uncertain and cannot be accurately predicted, including the duration and severity of the pandemic and the extent and severity of the impact on our customers, new information that may emerge concerning COVID-19, the actions taken to contain it or treat its impact and the economic impact on local, regional, national and international markets.

To date, we and our collaboration partners have been able to continue to supply our enzymes to our customers worldwide. However, we are dependent on our manufacturing and logistics partners and consequently, disruptions in operations of our partners and customers may affect our ability to supply enzymes to our customers. Furthermore, our ability to provide future research and development ("R&D") services will continue to be impacted as a result of governmental orders and any disruptions in operations of our customers with whom we collaborate. We are continuing to assess the potential impact of the COVID-19 pandemic on our business and operations, including our product sales, R&D service revenue, expenses and manufacturing. However, we are unable to fully determine and quantify the extent to which this pandemic affected our total revenues due to complex accounting judgments.

In the U.S., the impact of COVID-19, including governmental orders ("Orders") governing the operation of businesses during the pandemic, caused the temporary closure of our Redwood City, California facilities and has disrupted our research and development operations. Research and development operations for all other projects were temporarily suspended from mid-March 2020 through the end of April in accordance with these Orders. In May 2020, we initiated limited operations and gradually ramped up our R&D operations so that we are currently utilizing the majority of our normal R&D capacity. Additionally, we have resumed small scale manufacturing at our Redwood City pilot plant in May 2020.

Our future results of operations and liquidity could be adversely impacted by delays in payments of outstanding receivable amounts beyond normal payment terms, supply chain disruptions and uncertain demand, and the impact of any initiatives or programs that we may undertake to address financial and operations challenges faced by our customers. As of the date of issuance of these condensed consolidated financial statements, the extent to which the COVID-19 pandemic may materially impact our financial condition, liquidity, or results of operations is uncertain.

Note 12. Related Party

AstraZeneca PLC

Pam P. Cheng, a member of our board of directors for athree-year term expiring at our Annual Shareholder Meeting in June 2020, joined AstraZeneca PLC as Executive Vice President, Operations and Information Technology in June 2015. We sell biocatalyst products to AstraZeneca PLC and its controlled purchasing agents and contract manufacturers.

We recognized $20 thousand and $0.1 million in revenue in the three and six months ended June 30, 2020, respectively, compared to $0.4 million and $0.4 million in the three and six months ended June 30, 2019, respectively, from transactions with AstraZeneca PLC and its controlled purchasing agents and contract manufacturers. At June 30, 2020 and December 31, 2019, we had nominal and $0.3 million, respectively, of receivables from AstraZeneca PLC and its controlled purchasing agents and contract manufacturers, respectively.

Molecular Assemblies, Inc.

In June 2020, we entered into a Stock Purchase Agreement with Molecular Assemblies, Inc (“MAI”) pursuant to which we purchased1,587,050 shares of Series A preferred stock for $1.0 million in MAI and, concurrently with our initial equity investment, John Nicols, our chief executive officer, joined MAI’s board of directors.

At the same time, we entered into a Master Collaboration and Research Agreement (the “MAI Agreement”) with MAI to engineer DNA polymerase enzymes to deliver differentiated and cost-effective solutions for the enzymatic synthesis of DNA. Under the MAI Agreement and its related statement of work (“SOW”), we will apply our CodeEvolver® protein engineering platform technology to improve the DNA polymerase enzymes that are critical for enzymatic DNA synthesis.

Based on these services, we are eligible to earn additional Series A preferred stock of MAI. MAI will combine its advanced chemistries with our enzymes to drive the process to commercialization. Under the MAI Agreement and its associated SOW, we will engage in research and development activities to engineer DNA polymerase enzymes for the enzymatic synthesis of DNA and will receive monthly fees in the form of shares of Series A preferred stock in MAI. Such non-monetary payments will be earned over ten to thirteen months and issued thirty days in arrears after each calendar quarter-end. We are also eligible to receive amounts for bonuses, targets and milestones on achievement of timeline and project goals specified in the SOW. Payments for bonuses, targets and milestones on achievement of timeline and project goals are to be issued thirty days after the Company provides notification of completion. Under the MAI Agreement, we will have the right to use and sell the engineered enzymes to third parties for any purpose other than for the synthesis of native DNA. Under the MAI Agreement, we would make a $0.5 million payment to MAI on meeting a milestone of $5.0 million in aggregate commercial sales by the Company to third parties of the engineered enzymes or any product incorporating or derived from the engineered enzymes for any purpose other than the synthesis of native DNA. The MAI Agreement contemplates that we and MAI will enter into a Commercialization and Enzyme Supply Agreement (the "CESA") within six months following the completion of certain timelines specified in the SOW. In addition, we and MAI have agreed pursuant to the MAI Agreement to certain terms to be contained within the CESA in the event that the CESA becomes executed in the future. Those include: (a) that MAI would receive an exclusive license to use the DNA polymerase enzymes engineering by us under the MAI Agreement in the synthesis of native DNA and a non-exclusive license to use these enzymes for research and development on the synthesis of non-native DNA, and (b) that we would become the exclusive manufacturer of these enzymes for MAI, its affiliates and licensees.

We recognized no research and development revenue in the three and six months ended June 30, 2020 from transactions with MAI.

Note 13. Segment, Geographical and Other Revenue Information

Segment Information

We manage our business as two business segments: Performance Enzymes and Novel Biotherapeutics, which are based on our operating segments. Operating segments are defined as components of an enterprise about which separate financial information is available that is evaluated regularly by the CODM, or decision making group, in deciding how to allocate resources, and in assessing performance. Our CODM is our Chief Executive Officer. Our business segments are primarily based on our organizational structure and our operating results as used by our CODM in assessing performance and allocating resources for the Company.

We report corporate-related expenses such as legal, accounting, information technology, and other costs that are not otherwise included in our reportable business segments as "Corporate costs." All items not included in income (loss) from operations are excluded from the business segments.

We manage our assets on a total company basis, not by business segment, as the majority of our operating assets are shared or commingled. Our CODM does not review asset information by business segment in assessing performance or allocating resources, and accordingly, we do not report asset information by business segment.

Performance Enzymes

We initially commercialized our CodeEvolver® protein engineering technology platform and products in the pharmaceuticals market, and to date this continues to be our largest market served. Our customers, which include many large global pharmaceutical companies, use our technology, products and services in their manufacturing processes and process development. We have also used the technology to develop customized enzymes for use in other industrial markets. These markets consist of several large industrial verticals, including food and food ingredients, animal feed, flavors, fragrances, and agricultural chemicals. We also use our technology to develop enzymes for customers using NGS and PCR/qPCR for in vitro molecular diagnostic and molecular biology research applications.

Novel Biotherapeutics

We are also targeting new opportunities in the pharmaceutical industry to discover, improve, and/or develop biotherapeutic drug candidates. We believe that our CodeEvolver® protein engineering platform technology can be used to discover novel biotherapeutic drug candidates that will target human diseases that are in need of improved therapeutic interventions. Similarly, we believe that we can deploy our platform technology to improve specific characteristics of a customer's pre-existing biotherapeutic drug candidate, such as its activity, stability or immunogenicity. Most notable is our lead program for the potential treatment of PKU in humans. PKU is an inherited metabolic disorder in which the enzyme that converts the essential amino acid phenylalanine into tyrosine is deficient.

We have also developed a pipeline of other biotherapeutic drug candidates, which are in preclinical development, and in which we expect to continue to make additional investments with the aim of advancing additional product candidates targeting other therapeutic areas. In March 2020 we entered into the Takeda Agreement with Takeda under which we will research and develop protein sequences for use in gene therapy products for certain diseases.

Factors considered in determining the two reportable segments of the Company include the nature of business activities, the management structure directly accountable to our CODM for operating and administrative activities, availability of discrete financial information and information presented to the Board of Directors. Our CODM regularly reviews our segments and the approach provided by management for performance evaluation and resource allocation.

Operating expenses that directly support the segment activity are allocated based on segment headcount, revenue contribution or activity of the business units within the segments, based on the corporate activity type provided to the segment. The expense allocation excludes certain corporate costs that are separately managed from the segments. This provides the CODM with more meaningful segment profitability reporting to support operating decisions and allocate resources.

The following tables provide financial information by our reportable business segments along with a reconciliation to consolidated loss before income taxes (in thousands):

	Three months ended June 30, 2020			Three months ended June 30, 2019		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Revenues:						
Product revenue	$ 4,504	$ —	$ 4,504	$ 6,249	$ —	$ 6,249
Research and development revenue	3,002	7,461	10,463	4,340	1,730	6,070
Total revenues	7,506	7,461	14,967	10,589	1,730	12,319
Costs and operating expenses:						
Cost of product revenue	1,699	—	1,699	2,772	—	2,772
Research and development[1]	4,997	5,490	10,487	5,134	2,856	7,990
Selling, general and administrative[1]	2,375	621	2,996	2,362	561	2,923
Total segment costs and operating expenses	9,071	6,111	15,182	10,268	3,417	13,685
Income (loss) from operations	$ (1,565)	$ 1,350	$ (215)	$ 321	$ (1,687)	$ (1,366)
Corporate costs [2]			(5,316)			(4,698)
Depreciation and amortization			(506)			(427)
Loss before income taxes			$ (6,037)			$ (6,491)

(1) Research and development expenses and Selling, general and administrative expenses exclude depreciation and amortization of finance leases.

(2) Corporate costs include unallocated selling, general and administrative expense, interest income, and other income and expenses.

	Six months ended June 30, 2020			Six months ended June 30, 2019		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Revenues:						
Product revenue	$ 9,604	$ —	$ 9,604	$ 14,236	$ —	$ 14,236
Research and development revenue	8,775	11,258	20,033	6,440	7,225	13,665
Total revenues	18,379	11,258	29,637	20,676	7,225	27,901
Costs and operating expenses:						
Cost of product revenue	4,240	—	4,240	7,163	—	7,163
Research and development[1]	10,693	10,415	21,108	9,576	6,172	15,748
Selling, general and administrative[1]	4,720	1,213	5,933	4,463	1,078	5,541
Total segment costs and operating expenses	19,653	11,628	31,281	21,202	7,250	28,452
Loss from operations	(1,274)	(370)	(1,644)	(526)	(25)	(551)
Corporate costs [2]			(11,042)			(10,271)
Depreciation and amortization			(998)			(802)
Loss before income taxes			$ (13,684)			$ (11,624)

(1) Research and development expenses and Selling, general and administrative expenses exclude depreciation and amortization of finance leases.

(2) Corporate costs include unallocated selling, general and administrative expense, interest income, and other income and expenses.

The following tables provides stock-based compensation expense included in loss from operations (in thousands):

	Three months ended June 30,							
	2020				2019			
	Performance Enzymes	Novel Biotherapeutics	Corporate cost	Total	Performance Enzymes	Novel Biotherapeutics	Corporate cost	Total
Stock-based compensation	$ 741	$ 252	$ 946	$ 1,939	$ 601	$ 197	$ 1,190	$ 1,988

	Six months ended June 30,							
	2020				2019			
	Performance Enzymes	Novel Biotherapeutics	Corporate cost	Total	Performance Enzymes	Novel Biotherapeutics	Corporate cost	Total
Stock-based compensation	$ 1,496	$ 494	$ 2,118	$ 4,108	$ 1,237	$ 338	$ 2,476	$ 4,051

Significant Customers

Customers that each accounted for 10% or more of our total revenues were as follows:

	Percentage of Total Revenues for the			
	Three Months Ended June 30,		Six Months Ended June 30,	
	2020	2019	2020	2019
Customer A	16%	35%	20%	38%
Customer B	12%	14%	11%	26%
Customer C	*	11%	*	*
Customer D	*	*	13%	*
Customer E	38%	*	27%	*

Customers that each accounted for 10% or more of accounts receivable had balances as of the periods presented as follows:

	Percentage of Accounts Receivables as of	
	June 30, 2020	December 31, 2019
Customer A	26 %	38 %
Customer B	11 %	10 %
Customer D	30 %	*
Customer F	10 %	*

** Percentage was less than 10%*

Geographical Information

Geographic revenues are identified by the location of the customer and consist of the following (in thousands):

	Three Months Ended June 30,		Six months ended June 30,	
	2020	**2019**	**2020**	**2019**
Revenues				
Americas	$ 6,906	$ 4,076	$ 12,131	$ 6,913
EMEA	3,314	4,741	9,285	12,466
APAC	4,747	3,502	8,221	8,522
Total revenues	$ 14,967	$ 12,319	$ 29,637	$ 27,901

Identifiable long-lived assets by location was as follows (in thousands):

Long-lived assets	**June 30, 2020**	**December 31, 2019**
United States	$ 6,822	$ 6,282

Identifiable goodwill was as follows (in thousands):

	As of June 30, 2020 and December 31, 2019		
	Performance Enzymes	**Novel Biotherapeutics**	**Total**
Goodwill	$ 2,463	$ 778	$ 3,241

Note 14. Allowance for Credit Losses

An analysis of the allowance for credit losses is as follows (in thousands):

	Three and six months ended June 30, 2020
Beginning Balance January 1, 2020	$ 34
Write-offs charged against the allowance	—
Recoveries of amounts previously written off	—
Ending Balance June 30, 2020	$ 34

The following tables below summarizes accounts receivable by aging category (in thousands):

	June 30, 2020					
	31-60 Days	61-90 Days	91 days and over	Total over 31 days	Current	Total balance
Accounts receivable	$ —	$ 1,000	$ 39	$ 1,039	$ 12,996	$ 14,035

	December 31, 2019					
	31-60 Days	61-90 Days	91 days and over	Total over 31 days	Current	Total balance
Accounts receivable	$ 185	$ 7	$ 65	$ 257	$ 8,806	$ 9,063

ITEM 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following management's discussion and analysis of our financial condition and results of operations should be read in conjunction with the unaudited condensed consolidated financial statements and the related notes thereto included elsewhere in this Quarterly Report on Form 10-Q and the audited consolidated financial statements and notes thereto and management's discussion and analysis of financial condition and results of operations for the year ended December 31, 2019 included in our Annual Report on Form 10-K for the year ended December 31, 2019, as filed with the SEC on February 28, 2020 (the "Annual Report"). This Quarterly Report on Form 10-Q contains forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). These statements include, but are not limited to, expectations regarding our strategy, business plans, financial performance and developments relating to our industry. These statements are often identified by the use of words such as "may," "will," "expect," "believe," "anticipate," "intend," "could," "should," "estimate," or "continue," and similar expressions or variations. Such forward-looking statements are subject to risks, uncertainties and other factors that could cause actual results and the timing of certain events to differ materially from future results expressed or implied by such forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to, those discussed in Part II, Item 1A: "Risk Factors" of this Quarterly Report on Form 10-Q and Part I, Item 1A: "Risk Factors" of our Annual Report, as incorporated herein and referenced in Part II, Item 1A: "Risk Factors" of this Quarterly Report on Form 10-Q and elsewhere in this report. The forward-looking statements in this Quarterly Report on Form 10-Q represent our views as of the date of this Quarterly Report on Form 10-Q. We anticipate that subsequent events and developments will cause our views to change. However, while we may elect to update these forward-looking statements at some point in the future, we have no current intention of doing so except to the extent required by applicable law. You should, therefore, not rely on these forward-looking statements as representing our views as of any date subsequent to the date of this Quarterly Report on Form 10-Q.

Business Overview

We discover, develop and sell proteins that deliver value to our clients in a growing set of industries. We view proteins as a vast untapped source of value-creating materials, and we are using our proven technologies, which we have been continuously improving since our inception in 2002, to commercialize an increasing number of novel proteins, both as proprietary Codexis products and in partnership with our customers.

We are a pioneer in the harnessing of computational technologies to drive biology advancements. Since 2002, we have made substantial investments in the development of our CodeEvolver® protein engineering technology platform, the primary source of our competitive advantage. Our technology platform is powered by proprietary, artificial intelligence-based, computational algorithms that rapidly mine our large and continuously growing library of protein variants' performance attributes. These computational outputs enable increasingly reliable predictions for next generation protein variants to be engineered, enabling delivery of targeted performance enhancements in a time-efficient manner. In addition to its computational prowess, our CodeEvolver® protein engineering technology platform integrates additional modular competencies, including robotic high-throughput screening and genomic sequencing, organic chemistry and process development which are all coordinated to create our novel protein innovations.

Our approach to developing commercially viable biocatalytic manufacturing processes begins by conceptually designing the most cost-effective and practical process for a targeted product. We then develop optimized protein catalysts to enable that process design using our CodeEvolver® protein engineering platform technology. Engineered protein catalyst candidates many thousands for each protein engineering project are then rapidly screened and validated in high throughput screening under relevant manufacturing operating conditions. This approach results in an optimized protein catalyst enabling cost-efficient processes that typically are relatively simple to run in conventional manufacturing equipment. This also allows for the efficient technical transfer of our process to our manufacturing partners.

The successful embodiment of our CodeEvolver® protein engineering technology platform in commercial manufacturing processes requires well-integrated expertise in a number of technical disciplines. In addition to those directly involved in practicing our CodeEvolver® protein engineering platform technology, such as molecular biology, enzymology, microbiology, cellular engineering, metabolic engineering, bioinformatics, biochemistry and high throughput analytical chemistry, our process development projects also involve integrated expertise in organic chemistry, chemical process development, chemical engineering, fermentation process development and fermentation engineering. Our integrated, multi-disciplinary approach to biocatalyst and process development is a critical success factor for the Company.

We initially commercialized our CodeEvolver® protein engineering technology platform and products in the pharmaceuticals market, which remains a primary business focus. Our customers, which include many large global pharmaceutical companies, use our technology, products and services in their manufacturing processes and process development. We have also licensed our proprietary CodeEvolver® protein engineering technology platform to global pharmaceutical companies so that they may in turn use this technology to engineer enzymes for their own businesses. Most recently, in May 2019, we entered into a Platform Technology Transfer and License Agreement (the "Novartis CodeEvolver® Agreement") with Novartis Pharma AG ("Novartis"). The Novartis CodeEvolver® Agreement allows Novartis to use our proprietary CodeEvolver® protein engineering platform technology in the field of human healthcare.

As evidence of our strategy to extend our technology beyond pharmaceutical manufacturing, we have also used the technology to develop protein catalysts and industrial enzymes for use in a wider set of industrial markets. These target industries consist of several large market verticals, including food and food ingredients, animal feed, consumer care, flavors, fragrances and agricultural chemicals. In addition, we are using our technology to develop enzymes for customers using next generation sequencing ("NGS") and polymerase chain reaction ("PCR/qPCR") for in vitro molecular diagnostic and genomic research applications. In December 2019, we entered into a license agreement to provide Roche Sequencing Solutions, Inc. ("Roche") with our first enzyme for this target market, the Company's EvoT4™ DNA ligase. In June 2020, we entered into a co-marketing and enzyme supply collaboration agreement with Alphazyme LLC for the production and co-marketing of enzymes for life science applications including, initially, high-fidelity DNA polymerase, T7 RNA polymerase and reverse transcriptase enzymes

We have also begun using the CodeEvolver® protein engineering technology platform to develop early stage, novel biotherapeutic product candidates, both for our customers and for our own business. Our first lead program was for the potential treatment of phenylketonuria ("PKU") in humans. PKU is an inherited metabolic disorder in which the enzyme that converts the essential amino acid phenylalanine into tyrosine is deficient. In October 2017, we entered into the "Nestlé Agreement" with Nestlé Health Science to advance CDX-6114, our enzyme biotherapeutic product candidate for the potential treatment of PKU. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive license to develop and commercialize CDX-6114. In January 2020, we entered a development agreement with Nestlé Health Science to advance a lead candidate, CDX-7108, into preclinical development and early clinical studies. CDX-7108 is the lead candidate for a potential treatment for a gastro-intestinal disorder. In parallel, the original Strategic Collaboration Agreement was extended through December 2021 to support the discovery of therapeutic candidates for additional disorders. In March 2020, we entered into a Strategic Collaboration and License Agreement ("Takeda Agreement") with Shire Human Genetic Therapies, Inc., a wholly-owned subsidiary of Takeda Pharmaceutical Company Limited ("Takeda"), for the research and development of novel gene therapies for certain disease indications, including the treatment of lysosomal storage disorders and blood factor deficiencies.

Business Segments

We manage our business as two business segments: Performance Enzymes and Novel Biotherapeutics.

Performance Enzymes

We initially commercialized our CodeEvolver® protein engineering technology platform and products in the pharmaceuticals market, and to date this continues to be our largest market served. Our customers, which include many large global pharmaceutical companies, use our technology, products and services in their manufacturing processes and process development. We have also used the technology to develop customized enzymes for use in other industrial markets. These markets consist of several large industrial verticals, including food and food ingredients, animal feed, consumer care, flavors, fragrances, and agricultural chemicals. We also use our technology to develop enzymes for customers using NGS and PCR/qPCR for in vitro molecular diagnostic and molecular biology research applications.

Novel Biotherapeutics

We are also targeting new opportunities in the pharmaceutical industry to discover, improve, and/or develop biotherapeutic drug candidates. We believe that our CodeEvolver® protein engineering platform technology can be used to discover novel biotherapeutic drug candidates that will target human diseases that are in need of improved therapeutic interventions. Similarly, we believe that we can deploy our platform technology to improve specific characteristics of a customer's pre-existing biotherapeutic drug candidate, such as its activity, stability or immunogenicity. Our first lead program was for the potential treatment of hyperphenylalaninemia ("HPA") (also referred to as PKU) in humans. PKU is an inherited metabolic disorder in which the enzyme that converts the essential amino acid phenylalanine into tyrosine is deficient. In October 2017, we announced a global development, option and license agreement with Nestlé Health Science, to advance CDX-6114, our own novel orally administrable enzyme therapeutic candidate for the potential treatment of PKU. In July 2018, we announced that we had dosed the first subjects in a first-in-human Phase 1a dose-escalation trial with CDX-6114 for the potential treatment of PKU. The initiation of the trial triggered a $4.0 million milestone payment from Nestlé Health Science. The $1.0 million milestone payment that was triggered by the achievement of a formulation relating to CDX-6114 was received in February 2019. In January 2019, we received notice from the U.S. Food and Drug Administration (the "FDA") that it had completed its review of our investigational new drug application ("IND") for CDX-6114 and concluded that we may proceed with the proposed Phase 1b multiple ascending dose study in healthy volunteers in the United States. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive, worldwide, royalty-bearing, sub-licensable license for the global development and commercialization of CDX-6114 for the management of PKU. As a result of the option exercise, we earned a milestone and recognized $3.0 million in revenues in the first quarter of 2019. Upon exercising its option, Nestlé Health Science assumed all responsibilities for future clinical development and commercialization of CDX-6114, with the exception of the completion of an extension study, CDX-6114-004, which was substantially completed in the fourth quarter of 2019.

In October 2017, we separately entered into a Strategic Collaboration Agreement with Nestlé Health Science pursuant to which we and Nestlé Health Science are collaborating to leverage the CodeEvolver® platform technology to develop other novel enzymes for Nestlé Health Science's established Consumer Care and Medical Nutrition business areas. In January 2020, we and Nestlé Health Science entered into a development agreement pursuant to which we and Nestlé Health Science are collaborating to advance a lead candidate targeting a gastro-intestinal disorder discovered through our Strategic Collaboration Agreement into pre-clinical and early clinical studies. The Strategic Collaboration Agreement was extended through December 2021.

Using our CodeEvolver® protein engineering platform technology, we have also developed a pipeline of other biotherapeutic drug candidates, which are in preclinical development. We expect to continue to make additional investments in our pipeline with the aim of advancing additional product candidates targeting other therapeutic areas.

In March 2020, we entered into the Takeda Agreement with Takeda pursuant to which we are collaborating to research and develop protein sequences for use in gene therapy products for certain disease indications in accordance with each applicable program plans for Fabry Disease, Pompe Disease, and an unnamed blood factor deficiency. In March 2020, we received a one-time, non-refundable cash payment of $8.5 million.

For further description of our business segments, see Note 13, "Segment, Geographical and Other Revenue Information" in the Notes to Unaudited Condensed Consolidated Financial Statements included in this Quarterly Report on Form 10-Q.

Business Update Regarding COVID-19

We are subject to risks and uncertainties as a result of the current COVID-19 pandemic. The COVID-19 pandemic has presented a substantial public health and economic challenge around the world and is affecting our employees, communities and business operations, as well as the U.S. economy and other economies worldwide. The full extent to which the COVID-19 pandemic will directly or indirectly impact our business, results of operations and financial condition will depend on future developments that are highly uncertain and cannot be accurately predicted, including the duration and severity of the pandemic and the extent and severity of the impact on our customers, new information that may emerge concerning COVID-19, the actions taken to contain it or treat its impact and the economic impact on local, regional, national and international markets.

To date, we and our collaboration partners have been able to continue to supply our enzymes to our customers worldwide. However, we are dependent on our manufacturing and logistics partners and consequently, disruptions in operations of our partners and customers may affect our ability to supply enzymes to our customers. Furthermore, our ability to provide future research and development ("R&D") services will continue to be impacted as a result of governmental orders and any disruptions in operations of our customers with whom we collaborate. We are continuing to assess the potential impact of the COVID-19 pandemic on our business and operations, including our product sales, R&D service revenue, expenses and manufacturing. However, we are unable to fully determine and quantify the extent to which this pandemic affected our total revenues due to complex accounting judgments.

In the U.S., the impact of COVID-19, including governmental orders ("Orders") governing the operation of businesses during the pandemic, caused the temporary closure of our Redwood City, California facilities and has disrupted our research and development operations. Research and development operations for all other projects were temporarily suspended from mid-March 2020 through the end of April in accordance with these Orders. In May 2020, we initiated limited operations and gradually ramped up our R&D operations so that we are currently utilizing the majority of our normal R&D capacity. Additionally, we have resumed small scale manufacturing at our Redwood City pilot plant in May 2020.

Our future results of operations and liquidity could be adversely impacted by delays in payments of outstanding receivable amounts beyond normal payment terms, supply chain disruptions and uncertain demand, and the impact of any initiatives or programs that we may undertake to address financial and operations challenges faced by our customers. The extent to which the COVID-19 pandemic may materially impact our financial condition, liquidity, or results of operations is uncertain.

For additional information on the various risks posed by the COVID-19 pandemic, please read Item 1A. Risk Factors included in this Quarterly Report on Form 10-Q.

Recent Investing Activities

In June 2020, we entered into a Master Collaboration and Research Agreement ("MAI Agreement") with Molecular Assemblies, Inc. ("MAI"), to engineer enzymes to deliver differentiated and cost-effective solutions for the enzymatic synthesis of DNA. Under an associated stock purchase agreement, we purchased 1,587,050 shares of MAI's Series A preferred stock for $1.0 million and in connection with our investment, John Nicols, our chief executive officer, joined MAI's board of directors. Under the MAI Agreement, for a fixed monthly fee payable in shares of Series A preferred stock, we will apply our CodeEvolver® protein engineering platform technology to improve the DNA polymerase enzymes that are critical for enzymatic DNA synthesis. Through the provision of these services, we are eligible to earn additional shares of Series A preferred stock. MAI will combine its advanced chemistries with our enzymes to drive the process to commercialization. For additional information, see Note 12, "Related Party Transactions," in the Notes to Unaudited Condensed Consolidated Financial Statements included in this Quarterly Report on Form 10-Q.

Results of Operations Overview

Total revenues increased to $15.0 million for the second quarter of 2020 from $12.3 million for the second quarter of 2019, due to increases in research and development revenue partially offset by decreases in product revenue.

Product revenue for the second quarter of 2020 decreased by $1.7 million to $4.5 million from $6.2 million for the second quarter of 2019 due to timing of customer demand for branded products.

Research and development revenue increased by $4.4 million for the second quarter of 2020 to $10.5 million from $6.1 million in the second quarter of 2019, primarily due to revenues from Novartis under the Novartis CodeEvolver® Agreement and recognition of license fees from Takeda under the Takeda Agreement, partially offset by lower revenue as a result of delays attributable to the COVID-19 pandemic.

Product gross margins were 62% for the second quarter of 2020, compared to 56% in the second quarter of 2019, due to improved product mix. Our profit margins are affected by many factors including product pricing and costs of internal and third-party fixed and variable costs. Profit margin data are used as a management performance measure to provide additional information regarding our results of operations on a consolidated basis.

Research and development expense increased by $2.6 million, or 31%, to $10.9 million for the second quarter of 2020, compared to the second quarter of 2019, primarily due to an increase in costs associated with outside services relating to Chemistry, Manufacturing and Controls ("CMC") and regulatory expenses, higher headcount, and higher allocable expenses, partially offset by lower lab supply expenses and outside services.

Selling, general and administrative expense increased by $0.6 million, or 8%, to $8.5 million for the second quarter of 2020 compared to the second quarter of 2019, primarily due to an increase in costs associated with legal and accounting fees, higher facilities and headcount offset by lower allocable expenses.

Income earned in certain countries outside of the United States is subject to the imposition of income tax withholding by foreign taxing authorities when the income is paid to the United States. We recognized $0.3 million in income tax expense in the second quarter of 2020 due to the imposition of income tax on revenue by foreign taxing authorities.

Net loss for the second quarter of 2020 was $6.3 million, representing a net loss of $0.11 per basic and diluted share. This compares to a net loss of $6.5 million, representing a net loss of $0.12 per basic and diluted share for the second quarter of 2019. The decrease in net loss for the second quarter over the same period of the prior year is primarily related to increases in research and development revenue partially offset by higher research and development expenses and lower product revenue and related costs.

Cash and cash equivalents decreased by $14.8 million to $75.6 million as of June 30, 2020 compared to $90.5 million as of December 31, 2019. Net cash used in operating activities increased to $11.5 million in the six months ended June 30, 2020 compared to $7.9 million in the six months ended June 30, 2019. We believe that based on our current level of operations, our existing cash, and cash equivalents will provide adequate funds for ongoing operations, planned capital expenditures and working capital requirements for at least the next 12 months.

In June 2017, we entered into a loan and security agreement that allows us to borrow up to $10.0 million under a term loan, and up to $5.0 million under a revolving credit facility with 80% of certain eligible accounts receivable as a borrowing base (the "Credit Facility"). Obligations under the Credit Facility are secured by a lien on substantially all of our personal property other than our intellectual property. In September 2019, we entered into a Seventh Amendment to the Credit Facility whereby the draw period on the term debt was extended to September 30, 2020. We may draw on the Term Debt at any time prior to September 30, 2020, subject to customary conditions for funding including, among others, that no event of default exists. As of June 30, 2020, no amounts were borrowed under the Credit Facility and we were in compliance with the covenants for the Credit Facility. See Note 11, "Commitments and Contingencies" in the Notes to Unaudited Condensed Consolidated Financial Statements included in this Quarterly Report on Form 10-Q.

Below is an overview of our results of operations by business segments:

Performance Enzymes

Revenues decreased by $3.1 million, or 29%, to $7.5 million for the second quarter of 2020, compared to the second quarter of 2019,

Product gross margins were 62% in the second quarter of 2020, compared to 56% in the corresponding period in 2019 due to variations in product mix.

Research and development expense decreased by $0.1 million, or 3%, to $5.0 million for the second quarter of 2020, compared to the second quarter of 2019, primarily due to lower allocable expenses and lab supplies costs partially offset by an increase in costs associated with higher headcount and outside services.

Selling, general and administrative expense increased by $13 thousand, or 1%, to $2.4 million for the second quarter of 2020, compared to the second quarter of 2019, primarily due to higher stock compensation expense and allocable expenses partially offset by lower costs associated with travel and outside services.

Novel Biotherapeutics

Revenues increased by $5.7 million, or 331%, to $7.5 million for the second quarter of 2020, compared to the second quarter of 2019, primarily due tcrecognition of license fees from Takeda under the Takeda Strategic Collaboration and License Agreement, partially offset by a decrease in prior year functional license fee revenue from Nestlé Health Science.

Research and development expense increased by $2.6 million, or 92%, to $5.5 million for the second quarter of 2020, compared to the second quarter of 2019, primarily due to an increase in costs associated with outside services relating to CMC regulatory expenses, higher outside services, higher headcount and higher stock compensation expense.

Selling, general and administrative expense increased by $0.1 million, or 11%, to $0.6 million for the second quarter of 2020 compared to the second quarter of 2019, primarily due to an increase in costs associated with higher headcount, higher allocable expense and higher stock-based compensation.

GSK Platform Technology Transfer, Collaboration and License Agreement

In July 2014, we entered into a CodeEvolver® protein engineering platform technology transfer collaboration and license agreement (the "GSK CodeEvolver® Agreement") with GlaxoSmithKline ("GSK"). Pursuant to the terms of the agreement, we granted GSK a non-exclusive license to use the CodeEvolver® protein engineering platform technology to develop novel enzymes for use in the manufacture of GSK's pharmaceutical and health care products.

We received an up-front fee upon the execution of the agreement in July 2014 and milestone payments in each of the years from 2014 through April 2016. We completed the transfer of the CodeEvolver® protein engineering platform technology to GSK in April 2016 and all revenues relating to the technology transfer have been recognized as of April 2016. We have the potential to receive additional cumulative contingent payments that range from $5.75 million to $38.5 million per project based on GSK's successful application of the licensed technology. We are also eligible to receive royalties based on net sales, if any, of a limited set of products developed by GSK using our CodeEvolver® protein engineering platform technology.

In September 2019, we recognized revenue of $2.0 million for the milestone payment from GSK relating to the advancement of an enzyme developed by GSK using our CodeEvolver® protein engineering platform technology. We recognized no research and development revenue for the three and six months ended June 30, 2020 and 2019.

Merck Platform Technology Transfer and License Agreement

In August 2015, we entered into a CodeEvolver® platform technology transfer collaboration and license agreement (the "Merck CodeEvolver® Agreement") with Merck, Sharp & Dohme ("Merck"), which allows Merck to use the CodeEvolver® protein engineering technology platform in the field of human and animal healthcare.

We received an up-front license fee upon execution of the Merck CodeEvolver® Agreement, and milestone payments in September 2015 and in September 2016, when we completed the transfer of the engineering platform technology. Additionally, we recognized research and development revenues of $0.2 million and $1.0 million for the three and six months ended June 30, 2020, respectively, compared to $1.0 million and $2.0 million for the three and six months ended June 30, 2019, respectively, for various research projects under our collaborative arrangement.

We have the potential to receive payments of up to a maximum of $15.0 million for each commercial active pharmaceutical ingredient ("API") that is manufactured by Merck using one or more novel enzymes developed by Merck using the CodeEvolver® protein engineering technology platform. The API payments are based on the quantity of API developed and manufactured by Merck and will be recognized as usage-based royalties.

In January 2019, we entered into an amendment to the Merck CodeEvolver® Agreement to install certain CodeEvolver® protein engineering technology upgrades into Merck's platform license installation and maintain those upgrades for a multi-year term. The license installation was completed in 2019 and we recognized $0.9 million as license fee revenue accordingly in three and six months ended June 30, 2019, respectively, under the amendment. Pursuant to the agreement, Merck has options to future technology enhancements for a specified fee. As of June 30, 2020, Merck has not exercised its option for technology enhancements. We recognized $25 thousand and $0.1 million in research and development revenues for the three and six months ended June 30, 2020, respectively. As of June 30, 2020 and December 31, 2019, we had deferred revenue balances of $0.1 million and nil, respectively.

Global Development, Option and License Agreement, Strategic Collaboration Agreement, and Development Agreement

In October 2017, we entered into the Nestlé Agreement with Societé des Produits Néstle S.A., formerly known as Nestec Ltd. ("Nestlé Health Science") and, solely for the purpose of the integration and the dispute resolution clauses of the Agreement, Nestlé Health Science S.A., to advance CDX-6114, our enzyme biotherapeutic product candidate for the potential treatment of PKU.

We received an upfront cash payment of $14.0 million upon the execution of the Nestlé Agreement, a $4.0 million milestone payment after dosing the first subjects in a first-in-human Phase 1a dose-escalation trial with CDX-6114, and a $1.0 million milestone payment upon achievement of a milestone relating to formulation of CDX-6114. The $4.0 million milestone payment that was triggered by the initiation of the trial was received in September 2018 and the $1.0 million milestone payment that was triggered by the achievement of a formulation relating to CDX-6114 was received in February 2019. The upfront payment and the variable consideration relating to the progress payment of $4.0 million and milestone payment of $1.0 million were recognized over time as the development work was performed. Revenue was recognized using a single measure of progress that depicted our performance in transferring control of the services, which was based on the ratio of level of effort incurred to date compared to the total estimated level of effort required to complete all performance obligations under the agreement. We recognized nominal research and development revenue for the three and six months ended June 30, 2020, respectively, compared to $0.5 million and $1.7 million for the three and six months ended June 30, 2019, respectively.

In January 2019, we received notice from the U.S. Food and Drug Administration (the "FDA") that it had completed its review of our investigational new drug application (" IND") for CDX-6114 and concluded that we may proceed with the proposed Phase 1b multiple ascending dose study in healthy volunteers in the United States. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive, worldwide, royalty-bearing, sub-licensable license for the global development and commercialization of CDX-6114 for the management of PKU. The option payment of $3.0 million was recognized in the first quarter of 2019 as research and development revenue. Upon exercising its option, Nestlé Health Science assumed all responsibilities for future clinical development and commercialization of CDX-6114, with the exception of the completion of an extension study, CDX-6114-004, which was substantially completed in the fourth quarter of 2019. We are eligible to receive payments from Nestlé Health Science under the Nestlé Agreement that include (i) development and approval milestones of up to $85.0 million, (ii) sales-based milestones of up to $250.0 million in the aggregate, which aggregate amount is achievable if net sales exceed $1.0 billion in a single year, and (iii) tiered royalties, at percentages ranging from the middle single digits to low double-digits, of net sales of Product.

In October 2017, we also entered into a Strategic Collaboration Agreement (the “Strategic Collaboration Agreement”) with Nestlé Health Science pursuant to which we and Nestlé Health Science are collaborating to leverage the CodeEvolver® protein engineering technology platform to develop novel enzymes for Nestlé Health Science’s established Consumer Care and Medical Nutrition business areas. Under the Strategic Collaboration Agreement, we received an upfront payment of $1.2 million in 2017 and an incremental $0.6 million payment in September 2018 for additional services.

In January 2020, we and Nestlé Health Science entered into a development agreement pursuant to which we and Nestlé Health Science are collaborating to advance a lead candidate, CDX-7108, targeting a gastro-intestinal disorder discovered through our Strategic Collaboration Agreement into pre-clinical and early clinical studies. The Strategic Collaboration Agreement was extended through December 2021.

We recognized research and development fees of $1.7 million and $3.3 million for the three and six months ended June 30, 2020, respectively, compared to $1.2 million and $2.5 million for the three and six months ended June 30, 2019, respectively.

Strategic Collaboration Agreement

In April 2018, we entered into the Porton Agreement with Porton to license key elements of our biocatalyst technology for use in Porton’s global custom intermediate and API development and manufacturing business. Under the Porton Agreement, we are eligible to receive annual collaboration fees and research and development revenues. We received an initial collaboration fee of $0.5 million within 30 days of the effective date, $1.5 million upon the first anniversary of the effective date of the agreement. We recognized revenue of $1.0 million upon the second anniversary of the effective date of the agreement. We are eligible to receive $1.0 million on the third anniversary of the effective date of the agreement. We completed the technical transfer in the fourth quarter of 2018. Revenue relating to the functional license provided to Porton was recognized at a point in time when control of the license transferred to the customer. We recognized research and development revenue related to the Porton Agreement of $1.0 million and $1.1 million in the three and six months ended June 30, 2020, respectively, compared to nil in the three and six months ended June 30, 2019.

Platform Technology Transfer and License Agreement

In May 2019, we entered into a Platform Technology Transfer and License Agreement (the "Novartis CodeEvolver® Agreement") with Novartis Pharma AG ("Novartis"). The Agreement allows Novartis to use our proprietary CodeEvolver® protein engineering platform technology in the field of human healthcare. Under the Novartis CodeEvolver® Agreement, we are transferring our proprietary CodeEvolver® protein engineering platform technology to Novartis over approximately 23 months starting with the date on which we commenced the technology transfer (the "Technology Transfer Period"). As a part of this technology transfer, the Company provided to Novartis our proprietary enzymes, proprietary protein engineering protocols and methods, and proprietary software algorithms. In addition, teams of the Company and Novartis scientists participated in technology training sessions and collaborative research projects at our laboratories in Redwood City, California and at a designated Novartis laboratory in Basel, Switzerland. Upon completion of technology transfer, Novartis will have the CodeEvolver® protein engineering platform technology installed at its designated laboratory. Pursuant to the agreement, we received an upfront payment of $5.0 million shortly after the effective date of the Novartis CodeEvolver® Agreement. In the second quarter of 2020, we completed the second technology milestone transfer under the agreement and became eligible to receive a milestone payment of $4.0 million, which we subsequently received in July 2020. We are eligible to receive an additional $5.0 million upon satisfactory completion of the third technology transfer milestone. In consideration for the continued disclosure and license of improvements to our technology and materials during a multi-year period that begins on the conclusion of the Technology Transfer Period ("Improvements Term"), Novartis will pay us annual payments which amount to an additional $8.0 million. The Company also has the potential to receive quantity-dependent, usage payments for each API that is manufactured by Novartis using one or more enzymes that have been developed or are in development using the CodeEvolver® protein engineering platform technology during the period that begins on the conclusion of the Technology Transfer Period and ends on the expiration date of the last to expire licensed patent. These product-related usage payments, if any, will be paid by Novartis to the Company for each quarter that Novartis manufactures API using a CodeEvolver®-developed enzyme. The usage payments will be based on the total volume of API produced using the CodeEvolver®-developed enzyme. These usage payments can begin in the clinical stage and will extend throughout the commercial life of each API. Revenue for the combined initial license and technology transfer performance obligation, which is expected to occur over twenty-three months, is being recognized using a single measure of progress that depicts our performance in transferring control of the services, which is based on the ratio of level of effort incurred to date compared to the total estimated level of effort required to complete the performance obligation relating to the combined initial license and technology transfer. Revenue allocated to future improvements will be recognized during the Improvement Term. We recognized $0.9 million and $3.7 million in research and development revenue for the three and six months ended June 30, 2020, respectively, and no revenue for the three and six months ended June 30, 2019, respectively, from the Novartis CodeEvolver® Agreement.

Strategic Collaboration and License Agreement

In March 2020, we entered into a Strategic Collaboration and License Agreement (the "Takeda Agreement") with Shire Human Genetic Therapies, Inc., a wholly-owned subsidiary of Takeda Pharmaceutical Co. Ltd. ("Takeda"), under which we will collaborate to research and develop protein sequences for use in gene therapy products for certain diseases. On execution of the Takeda Agreement, we received an up-front non-refundable cash payment of $8.5 million. Revenue relating to the functional licenses provided to Takeda was recognized at a point in time when the control of the license transferred to the customer. We recognized license fees of $5.7 million and $8.0 million as research & development revenue in the three and six months ended June 30, 2020, respectively. Other potential payments from Takeda include (i) reimbursement of research and development fees and pre-clinical approval milestones for initial programs of up to $22.3 million, (ii) development and commercialization-based milestones, per target gene, of up to $100.0 million, the modulation of which leads to treatment of certain diseases by the applicable product, and (iii) tiered royalties, at percentages ranging from the middle-single digit to low single-digit of sales of the applicable product.

Master Collaboration and Research Agreement and Stock Purchase Agreement

In June 2020, we entered into a Stock Purchase Agreement with Molecular Assemblies, Inc. ("MAI") pursuant to which we purchased 1,587,050 shares of MAI's Series A preferred stock for $1.0 million. In connection with the transaction, our chief executive officer, John Nicols, also joined MAI's board of directors.

At the same time, we entered into a Master Collaboration and Research Agreement (the "MAI Agreement") with MAI to engineer DNA polymerase enzymes to deliver differentiated and cost-effective solutions for the enzymatic synthesis of DNA. Under the MAI Agreement and its related statement of work ("SOW"), we will apply our CodeEvolver® protein engineering platform technology to improve the DNA polymerase enzymes that are critical for enzymatic DNA synthesis. Based on these services, the Company is eligible to earn additional shares of MAI's Series A preferred stock. MAI will combine its advanced chemistries with our enzymes to drive the process to commercialization. Under the MAI Agreement and its associated SOW, we will engage in research and development activities to engineer DNA polymerase enzymes for the enzymatic synthesis of DNA in exchange for monthly fees in the form of shares of Series A preferred stock in MAI. We are eligible to earn such non-monetary payments over ten to thirteen months, and any such shares would be issued thirty days in arrears after each calendar quarter-end. We are also eligible to receive amounts for bonuses, targets and milestones on achievement of timeline and project goals specified in the SOW. Payments for bonuses, targets and milestones on achievement of timeline and project goals are to be issued thirty days after the Company provides notification of completion. Under the MAI Agreement, the Company will have the right to use and sell the engineered enzymes to third parties for any purpose other than for the synthesis of native DNA. Under the MAI Agreement, we would make a $0.5 million payment to MAI on meeting a milestone of $5.0 million in aggregate commercial sales by the Company to third parties of the engineered enzymes or any product incorporating or derived from the engineered enzymes for any purpose other than the synthesis of native DNA. The MAI Agreement contemplates that we and MAI will enter into a Commercialization and Enzyme Supply Agreement (the "CESA") within six months following the completion of certain timelines specified in the SOW. In addition, we and MAI have agreed pursuant to the MAI Agreement to certain terms to be contained within the CESA in the event that the CESA becomes executed in the future. Those include: (a) that MAI would receive an exclusive license to use the DNA polymerase enzymes engineering by us under the MAI Agreement in the synthesis of native DNA and a non-exclusive license to use these enzymes for research and development on the synthesis of non-native DNA, and (b) that we would become the exclusive manufacturer of these enzymes for MAI, its affiliates and licensees.

We recognized no research and development revenue in the three and six months ended June 30, 2020 from transactions with MAI.

Results of Operations

The following table shows the amounts from our unaudited condensed consolidated statements of operations for the periods presented (in thousands):

	Three months ended June 30,		Change		Six months ended June 30,		Change	
	2020	2019	$	%	2020	2019	$	%
Revenues:								
Product revenue	$ 4,504	$ 6,249	$ (1,745)	(28)%	$ 9,604	$ 14,236	$ (4,632)	(33)%
Research and development revenue	10,463	6,070	4,393	72%	20,033	13,665	6,368	47%
Total revenues	14,967	12,319	2,648	21%	29,637	27,901	1,736	6%
Costs and operating expenses:								
Cost of product revenue	1,699	2,772	(1,073)	(39)%	4,240	7,163	(2,923)	(41)%
Research and development	10,853	8,274	2,579	31%	21,820	16,290	5,530	34%
Selling, general and administrative	8,522	7,896	626	8%	17,512	16,311	1,201	7%
Total costs and operating expenses	21,074	18,942	2,132	11%	43,572	39,764	3,808	10%
Loss from operations	(6,107)	(6,623)	516	8%	(13,935)	(11,863)	(2,072)	(17)%
Interest income	57	220	(163)	(74)%	323	450	(127)	(28)%
Other income (expenses), net	13	(88)	101	115%	(72)	(211)	139	66%
Loss before income taxes	(6,037)	(6,491)	454	7%	(13,684)	(11,624)	(2,060)	(18)%
Provision for income taxes	307	16	291	1,819%	312	19	293	1,542%
Net loss	$ (6,344)	$ (6,507)	$ 163	3%	$ (13,996)	$ (11,643)	$ (2,353)	(20)%

Revenues

Our revenues comprise product revenue and research and development revenue as follows:

- Product revenue consists of sales of protein catalysts, pharmaceutical intermediates, and Codex® biocatalyst panels and kits.
- Research and development revenue include license, technology access and exclusivity fees, research services fees, milestone payments, royalties, optimization and screening fees.

The following table shows the amounts of our product revenue and research and development revenue from our unaudited condensed consolidated statements of operations for the periods presented (in thousands):

	Three months ended June 30,		Change		Six months ended June 30,		Change	
(In Thousands)	**2020**	**2019**	**$**	**%**	**2020**	**2019**	**$**	**%**
Product revenue	$ 4,504	$ 6,249	$ (1,745)	(28)%	$ 9,604	$ 14,236	$ (4,632)	(33)%
Research and development revenue	10,463	6,070	4,393	72%	20,033	13,665	6,368	47%
Total revenues	$ 14,967	$ 12,319	$ 2,648	21%	$ 29,637	$ 27,901	$ 1,736	6%

Revenues typically fluctuate on a quarterly basis due to the variability in our customers' manufacturing schedules and the timing of our customers' clinical trials. In addition, we have limited internal capacity to manufacture enzymes. As a result, we are dependent upon the performance and capacity of third-party manufacturers for the commercial scale manufacturing of the enzymes used in our pharmaceutical and fine chemicals business.

We accept purchase orders for deliveries covering periods from one day up to approximately 14 months from the date on which the order is placed. However, a majority of the purchase orders can be revised or cancelled by the customer without penalty. Considering these industry practices and our experience, we do not believe the total of customer purchase orders outstanding (backlog) provides meaningful information that can be relied on to predict actual sales for future periods.

Total revenues increased by $2.6 million and $1.7 million in the three and six months ended June 30, 2020, respectively, compared to the same periods in 2019, primarily due to higher research and development revenue offset by lower product revenue.

Product revenue decreased by $1.7 million and $4.6 million in the three and six months ended June 30, 2020, respectively, compared to the same periods in 2019, primarily due to timing of customer demand for branded products.

Research and development revenue increased by $4.4 million and $6.4 million in the three and six months ended June 30, 2020, respectively, compared to the same periods in 2019. The increase in research and development revenue was primarily due to revenues from Novartis Pharma AG under the Novartis CodeEvolver® Agreement, recognition of license fees from Takeda under the Takeda Strategic Collaboration and License Agreement, and recognition of license fees from Porton, partially offset by lower revenue and prior year functional license fee revenue from Nestlé Health Science.

Cost and Operating Expenses

Our cost and operating expenses comprise cost of product revenue, research and development expense, and selling, general and administrative expense. The following table shows the amounts of our cost of product revenue, research and development expense, and selling, general and administrative expense from our unaudited condensed consolidated statements of operations for the periods presented (in thousands):

	Three months ended June 30,		Change		Six months ended June 30,		Change	
(In Thousands)	**2020**	**2019**	**$**	**%**	**2020**	**2019**	**$**	**%**
Cost of product revenue	$ 1,699	$ 2,772	$ (1,073)	(39)%	4,240	7,163	$ (2,923)	(41)%
Research and development	10,853	8,274	2,579	31%	21,820	16,290	5,530	34%
Selling, general and administrative	8,522	7,896	626	8%	17,512	16,311	1,201	7%
Total costs and operating expenses	$ 21,074	$ 18,942	$ 2,132	11%	$ 43,572	$ 39,764	$ 3,808	10%

Cost of Product Revenue and Product Gross Margin

Our revenues from product revenue are derived entirely from our Performance Enzymes segment. Revenues from the Novel Biotherapeutics segment are from collaborative research and development activities and not from product revenue.

The following table shows the amounts of our product revenue, cost of product revenue, product gross profit and product gross margin from our unaudited condensed consolidated statements of operations for the periods presented (in thousands):

	Three months ended June 30,		Change		Six months ended June 30,		Change	
(In Thousands)	**2020**	**2019**	**$**	**%**	**2020**	**2019**	**$**	**%**
Product revenue	$ 4,504	$ 6,249	$ (1,745)	(28)%	$ 9,604	$ 14,236	$ (4,632)	(33)%
Cost of product revenue	1,699	2,772	(1,073)	(39)%	4,240	7,163	(2,923)	(41)%
Product gross profit	$ 2,805	$ 3,477	$ (672)	(19)%	$ 5,364	$ 7,073	$ (1,709)	(24)%
Product gross margin (%)	62 %	56 %			56 %	50 %		

Cost of product revenue comprises both internal and third-party fixed and variable costs, including materials and supplies, labor, facilities and other overhead costs associated with our product revenue.

Product gross margins were 62% and 56% in the three and six months ended June 30, 2020, respectively, compared to 56% and 50% and in the corresponding periods in 2019 due to variations in product mix.

Research and Development Expenses

Research and development expenses consist of costs incurred for internal projects as well as collaborative research and development activities. These costs primarily consist of (i) employee-related costs, which include salaries and other personnel-related expenses (including stock-based compensation), (ii) various allocable expenses, which include occupancy-related costs, supplies, and depreciation of facilities and laboratory equipment, and (iii) external costs. Research and development expenses are expensed when incurred.

Research and development expenses increased by $2.6 million, or 31%, during the three months ended June 30, 2020 and by $5.5 million, or 34%, in the six months ended June 30, 2020, compared to the same periods in 2019. The increase in research and development expenses was primarily due to an increase in costs associated with outside services relating to CMC and regulatory expenses, higher headcount, and higher allocable expenses partially offset by lower lab supplies and outside services.

Selling, General and Administrative Expenses

Selling, general and administrative expenses consist of employee-related costs, which include salaries and other personnel-related expenses (including stock-based compensation), hiring and training costs, consulting and outside services expenses (including audit and legal costs), marketing costs, building lease costs, and depreciation and amortization expense.

Selling, general and administrative expenses increased by $0.6 million, or 8%, in the three months ended June 30, 2020. and by $1.2 million, or 7%, in the six months ended June 30, 2020 compared to the same periods in 2019. The increase in selling, general and administrative expense was primarily due to an increase in costs associated with legal and accounting fees, higher facilities and headcount, and licensed technology partially offset by lower allocable expenses and lower travel expenses.

Interest Income and Other Expense

	Three months ended June 30,		Change		Six months ended June 30,		Change	
(In Thousands)	**2020**	**2019**	**$**	**%**	**2020**	**2019**	**$**	**%**
Interest income	$ 57	$ 220	$ (163)	(74)%	323	450	$ (127)	(28)%
Other income (expense), net	13	(88)	101	115%	(72)	(211)	139	66%
Total other income	$ 70	$ 132	$ (62)	(47)%	$ 251	$ 239	$ 12	5%

Interest Income

Interest income decreased by $0.2 million and $0.1 million in the three and six months ended June 30, 2020, respectively, compared to the same periods in 2019 due to lower average interest rates on declining average cash balances.

Other Income (Expense)

Other income increased by $0.1 million in three and six months ended June 30, 2020, respectively, compared to the same period in 2019 due to increases in fluctuations in foreign currency.

Provision for Income Taxes

We recognized an income tax provision of $0.3 million in the three and six months ended June 30, 2020, respectively. We recognized an income tax provision of $16 thousand and $19 thousand in the three and six months ended June 30, 2019, respectively. The increase in income tax provision was primarily due to mandatory income tax withheld by a foreign taxing authority and additional interest recorded on uncertain tax positions from previous years.

Net loss

The net loss for the second quarter of 2020 was $6.3 million, representing a net loss of $0.11 per basic and diluted share. This compares to a net loss of $6.5 million, representing a net loss of $0.12 per basic and diluted share for the second quarter of 2019. The decrease in net loss for the three months ended June 30, 2020 compared to the same period of the prior year was primarily related to increases in revenue partially offset by higher operating expenses and the impact of the COVID-19 pandemic.

For the six months ended June 30, 2020, the net loss was $14.0 million, representing a net loss of $0.24 per basic and diluted share. This compares to a net loss of $11.6 million, representing a net loss of $0.21 per basic and diluted share for the six months ended June 30, 2019. The increase in net loss for the six months ended June 30, 2020 compared to the same period of the prior year was primarily related to higher operating expenses and the impact of the COVID-19 pandemic partially offset by increases in revenue.

Results of Operations by Segment (in thousands, except percentages)

Revenue by segment

	Three months ended June 30,						Change			
	2020			2019			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Revenues:										
Product revenue	$ 4,504	$ —	$ 4,504	$ 6,249	$ —	$ 6,249	$ (1,745)	(28)%	$ —	— %
Research and development revenue	3,002	7,461	10,463	4,340	1,730	6,070	(1,338)	(31)%	5,731	331 %
Total revenues	$ 7,506	$ 7,461	$ 14,967	$ 10,589	$ 1,730	$ 12,319	$ (3,083)	(29)%	$ 5,731	331 %

	Six months ended June 30,						Change			
	2020			2019			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Revenues:										
Product revenue	$ 9,604	$ —	$ 9,604	$ 14,236	$ —	$ 14,236	$ (4,632)	(33)%	$ —	— %
Research and development revenue	8,775	11,258	20,033	6,440	7,225	13,665	2,335	36 %	4,033	56 %
Total revenues	$ 18,379	$ 11,258	$ 29,637	$ 20,676	$ 7,225	$ 27,901	$ (2,297)	(11)%	$ 4,033	56 %

Revenues from the Performance Enzymes segment decreased by $3.1 million, or 29%, to $7.5 million for the three months ended June 30, 2020, compared to the three months ended June 30, 2019. Revenues decreased by $2.3 million, or 11%, to $18.4 million for the six months ended June 30, 2020, compared to the six months ended June 30, 2019, primarily due to a decrease in product revenue due to timing of customer demand for branded products partially offset by recognition of evenue from Novartis Pharma AG under the Novartis CodeEvolver® Agreement, revenue under a license agreement with Roche Sequencing Solutions, Inc. licensing our EvoT4 DNA™ ligase high-performance molecular diagnostic enzyme, and license fees from Porton.

Revenues from the Novel Biotherapeutics segment increased by $5.7 million, or 331%, to $7.5 million for the three months ended June 30, 2020, compared to the three months ended June 30, 2019. Revenues increased by $4.0 million, or 56%, to $11.3 million for the six months ended June 30, 2020, compared to the six months ended June 30, 2019, primarily due to recognition of license fees from Takeda under the Takeda Strategic Collaboration and License Agreement, partially offset by adecrease in prior year functional license fee revenue from Nestlé Health Science.

Cost and Operating Expenses by Segment

	Three months ended June 30,						Change			
	2020			2019			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Cost of product revenue	$ 1,699	$ —	$ 1,699	$ 2,772	$ —	$ 2,772	$ (1,073)	(39)%	$ —	— %
Research and development [1]	4,997	5,490	10,487	5,134	2,856	7,990	(137)	(3)%	2,634	92 %
Selling, general and administrative [1]	2,375	621	2,996	2,362	561	2,923	13	1 %	60	11 %
Total segment costs and operating expenses	$ 9,071	$ 6,111	15,182	$ 10,268	$ 3,417	13,685	$ (1,197)	(12)%	$ 2,694	79 %
Corporate costs			5,386			4,830				
Depreciation and amortization			506			427				
Total costs and operating expenses			$ 21,074			$ 18,942				

(1) Research and development expenses and Selling, general and administrative expenses exclude depreciation and amortization of finance leases.

	Six months ended June 30,						Change			
	2020			2019			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Cost of product revenue	$ 4,240	$ —	$ 4,240	$ 7,163	$ —	$ 7,163	$ (2,923)	(41)%	$ —	0 %
Research and development[1]	10,693	10,415	21,108	9,576	6,172	15,748	1,117	12 %	4,243	69 %
Selling, general and administrative[1]	4,720	1,213	5,933	4,463	1,078	5,541	257	6 %	135	13 %
Total segment costs and operating expenses	$ 19,653	$ 11,628	31,281	$ 21,202	$ 7,250	28,452	$ (1,549)	(7)%	$ 4,378	60 %
Corporate costs			11,293			10,510				
Depreciation and amortization			998			802				
Total costs and operating expenses			$ 43,572			$ 39,764				

(1) Research and development expenses and Selling, general and administrative expenses exclude depreciation and amortization of finance leases.

For a discussion of product cost of revenue, see "*Results of Operations*".

Research and development expense in the Performance Enzymes segment decreased by $0.1 million, or 3%, to $5.0 million in the second quarter of 2020, compared to the second quarter of 2019. The decrease was primarily due to lower allocable expenses partially offset by an increase in costs associated with higher headcount and outside services. Research and development expense in the Performance Enzymes segment increased by $1.1 million, or 12%, to $10.7 million in the six months ended June 30, 2020 compared to the corresponding period in 2019. The increase was primarily due to an increase in costs associated with higher headcount partially offset by lower allocable expenses and lab supplies costs.

Selling, general and administrative expense in the Performance Enzymes segment increased by $13.0 thousand, or 1%, to $2.4 million in the second quarter of 2020, compared to the second quarter of 2019. Selling, general and administrative expense in the Performance Enzymes segment increased by $0.3 million, or 6%, to $4.7 million in the six months ended June 30, 2020, compared to the corresponding period in 2019. The increase was primarily due to higher stock compensation expense and allocable expenses partially offset by lower costs associated with travel and outside services.

Research and development expense in the Novel Biotherapeutics segment increased by $2.6 million, or 92%, to $5.5 million in the second quarter of 2020, compared to the second quarter of 2019. Research and development expense in the Novel Biotherapeutics segment increased by $4.2 million, or 69%, to $10.4 million in the second quarter 2020, compared to the same corresponding period in 2019. The increase was primarily due to an increase in costs associated with outside services relating to CMC regulatory expenses for CDX-7108 which we are developing pursuant to our development agreement with Nestlé Health Science and higher headcount and higher allocable expenses.

Selling, general and administrative expense in the Novel Biotherapeutics segment increased by $0.1 million, or 11%, to $0.6 million in the second quarter of 2020, compared to the second quarter of 2019. Selling, general and administrative expense in the Novel Biotherapeutics segment increased by $0.1 million, or 13%, to $1.2 million in the six months ended June 30, 2020, compared to the corresponding period in 2019. The increase was primarily due to an increase in costs associated with higher headcount and higher stock-based compensation partially offset by a reduction in allocable expenses.

Liquidity and Capital Resources

Liquidity is the measurement of our ability to meet working capital needs and to fund capital expenditures. We have historically funded our operations primarily through cash generated from operations, stock option exercises and public and private offerings of our common stock. We also have the ability to borrow up to $15.0 million under our Credit Facility. We actively manage our cash usage and investment of liquid cash to ensure the maintenance of sufficient funds to meet our working capital needs. The majority of our cash and cash equivalents are held in U.S. banks, and our foreign subsidiaries maintain a limited amount of cash in their local banks to cover their short-term operating expenses.

The following is a summary of cash and cash equivalents balances and working capital as of June 30, 2020 and December 31, 2019 (in thousands):

(In Thousands)	June 30, 2020	December 31, 2019
Cash and cash equivalents	$ 75,649	$ 90,498
Working capital	$ 87,554	$ 98,817

We have historically experienced negative cash flows from operations as we continue to invest in key technology development projects and improvements to our CodeEvolver® protein engineering technology platform and expand our business development and collaboration with new customers. Our cash flows from operations will continue to be affected principally by sales and gross margins from licensing our technology to major pharmaceutical companies, product revenue and collaborative research and development services provided to customers, as well as our headcount costs, primarily in research and development. Our primary source of cash flows from operating activities is cash receipts from licensing our technology to major pharmaceutical companies, and our customers for purchases of products and/or collaborative research and development services. Our largest uses of cash from operating activities are for employee-related expenditures, rent payments, inventory purchases to support our product revenue and non-payroll research and development costs.

We are actively collaborating with new and existing customers in the pharmaceutical and food industries. We believe that we can utilize our current products and services, and develop new products and services, to increase our revenues and gross margins in future periods.

In addition to our existing cash and cash equivalents, we are eligible to earn milestone and other contingent payments for the achievement of defined collaboration objectives and certain royalty payments under our collaboration agreements. Our ability to earn these milestone and contingent payments and the timing of achieving these milestones is primarily dependent upon the outcome of our collaborators' research and development activities and is uncertain at this time. In 2016, we completed the final phase in the transfer of CodeEvolver® technology to Merck under the Merck CodeEvolver® Agreement. Following the completion of the technology transfer to Merck, we are now eligible to receive payments of up to $15.0 million for each commercial API that is manufactured by Merck using one or more novel enzymes developed by Merck using the CodeEvolver® technology. In addition, depending upon GSK's successful application of the licensed technology, we have the potential to receive additional contingent payments that range from $5.75 million to $38.5 million per project. In May 2019, we entered into a Platform Technology Transfer and License Agreement with Novartis Pharma AG. The Novartis CodeEvolver® Agreement allows Novartis to use the Company's proprietary CodeEvolver® protein engineering platform technology in the field of human healthcare. Pursuant to the agreement, we received an upfront payment of $5.0 million shortly after the effective date of the Novartis CodeEvolver® Agreement. In the second quarter of 2020, we completed the second technology transfer milestone under the agreement and became eligible to receive a milestone payment of $4.0 million, which we subsequently received in July 2020. We are eligible to receive an additional $5.0 million upon satisfactory completion of the third technology transfer milestone. In consideration for the continued disclosure and license of improvements to the our technology and materials during a multi-year period that begins on the conclusion of the Technology Transfer Period, Novartis will pay us annual payments which amount to an additional $8.0 million.

In October 2017, we entered into the Nestlé Agreement with Nestlé Health Science. Pursuant to the Nestlé Agreement, Nestlé Health Science paid us an upfront cash payment of $14.0 million. In July 2018, we announced that we had dosed the first subjects in a first-in-human Phase 1a dose-escalation trial with CDX-6114 for the potential treatment of PKU. The initiation of the trial triggered a $4.0 million milestone payment from Nestlé Health Science and the $1.0 million milestone payment that was triggered by the achievement of a formulation relating to CDX-6114 was received in February 2019. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive, worldwide, royalty-bearing, sub-licensable license for the global development and commercialization of CDX-6114 for the management of PKU. The option payment of $3.0 million was recognized in the first quarter of 2019 as research and development revenue. Upon exercising its option, Nestlé Health Science assumed all responsibilities for future clinical development and commercialization of CDX-6114, with the exception of the completion of an extension study, CDX-6114-004, which was substantially completed in the fourth quarter of 2019. Other potential payments from Nestlé Health Science to us under the Nestlé Agreement include (i) development and approval milestones of up to $85.0 million, (ii) sales-based milestones of up to $250.0 million in the aggregate, which aggregate amount is achievable if net sales exceed $1.0 billion in a single year, and (iii) tiered royalties, at percentages ranging from the middle single digits to low double-digits, of net sales of Product.

In March 2020, we entered into a Strategic Collaboration and License Agreement with Takeda under which we received an up-front non-refundable cash payment of $8.5 million in March 2020. Other potential payments from Takeda include (i) of research and development fees and pre-clinical approval milestones for initial programs of up to $22.3 million, (ii) development and commercialization-based milestones, per target gene, of up to $100.0 million, the modulation of which leads to treatment of certain diseases by the applicable product, and (iii) tiered royalties, at percentages ranging from the middle-single digit to low single-digit of sales of the applicable product.

In December 2018, we filed an automatic shelf registration statement on Form S-3 (the "2018 Registration Statement") with the SEC, under which we may sell common stock, preferred stock, debt securities, warrants, purchase contract and/or units, which immediately became effective upon filing. Subsequently in 2019, we entered into a Securities Purchase Agreement with an affiliate of Casdin Capital, LLC ("Casdin") pursuant to which we issued and sold to Casdin 3,048,780 shares of our common stock at a purchase price of $16.40 per share (the "Private Offering"). After deducting issuance costs of $0.1 million from the Private Offering, our net proceeds were $49.9 million.

In June 2017, we entered into the Credit Facility, which consists of term debt for loans that allow us to borrow up to $10.0 million and a revolving credit facility that allows us to borrow up to $5.0 million with a certain eligible accounts receivable borrowing base of 80% of eligible accounts receivable. In January 2019, we entered into a Fifth Amendment to the Credit Facility to allow for the Company to obtain a letter of credit of up to $1.1 million to secure its obligations under the Lease with MetLife. In July 2019, we entered into a Sixth Amendment to the Credit Facility to increase permitted indebtedness to $0.7 million for financing insurance premiums in the ordinary course of business. In September 2019, we entered into a Seventh Amendment to the Credit Facility whereby the draw period on the term debt was extended to September 30, 2020. We may draw on the term debt at any time prior to September 30, 2020, subject to customary conditions for funding including, among others, that no event of default exists. Draws on the Credit Facility are secured by a lien on substantially all of our personal property other than our intellectual property. We may draw on the revolving line of credit at any time prior to the maturity date. On October 1, 2023, any loans for Term Debt mature and the Revolving Line of Credit terminates. No amounts were drawn down under the credit facility as of June 30, 2020. At June 30, 2020, we believe we were in compliance with the covenants for the Credit Facility. The Credit Facility requires us to maintain compliance with certain financial covenants including attainment of certain lender-approved projections or maintenance of certain minimum cash levels. Restrictive covenants in the Credit Facility restrict the payment of dividends or other distributions. For additional information about our contractual obligations, see Note 11, "Commitments and Contingencies" in the Notes to Unaudited Condensed Consolidated Financial Statements included in this Quarterly Report on Form 10-Q.

We are subject to risks and uncertainties as a result of the current COVID-19 pandemic. The COVID-19 pandemic has presented a substantial public health and economic challenge around the world and is affecting our employees, communities and business operations, as well as the U.S. economy and other economies worldwide. The full extent to which the COVID-19 pandemic will directly or indirectly impact our business, results of operations and financial condition will depend on future developments that are highly uncertain and cannot be accurately predicted, including the duration and severity of the pandemic and the extent and severity of the impact on our customers, new information that may emerge concerning COVID-19, the actions taken to contain it or treat its impact and the economic impact on local, regional, national and international markets. To date, we and our collaboration partners have been able to continue to supply our enzymes to our customers worldwide. However, we are dependent on our manufacturing and logistics partners and consequently, disruptions in operations of our partners and customers may affect our ability to supply enzymes to our customers. Furthermore, our ability to provide future research and development ("R&D") services will continue to be impacted as a result of governmental orders and any disruptions in operations of our customers with whom we collaborate. We are continuing to assess the potential impact of the COVID-19 pandemic on our business and operations, including our product sales, R&D service revenue, expenses and manufacturing. However, we are unable to fully determine and quantify the extent to which this pandemic affected our total revenues due to complex accounting judgments. In the U.S., the impact of COVID-19, including governmental orders ("Orders") governing the operation of businesses during the pandemic, had caused the temporary closure of our Redwood City, California facilities from mid-March 2020 through the end of April and has disrupted our research and development operations. In May 2020, we initiated limited operations and gradually ramped up our R&D operations so that we are currently operating utilizing the majority of our normal R&D capacity. Our future results of operations and liquidity could be adversely impacted by delays in payments of outstanding receivable amounts beyond normal payment terms, supply chain disruptions and uncertain demand, and the impact of any initiatives or programs that we may undertake to address financial and operations challenges faced by our customers. While we believe we have adequate cash on hand to manage through the disruptions being caused by the COVID-19 pandemic, the extent to which the pandemic may materially impact our financial condition, liquidity, or results of operations is uncertain. For additional information on the various risks posed by the COVID-19 pandemic, please read Item 1A. Risk Factors included in this Quarterly Report on Form 10-Q.

As of June 30, 2020, we had cash and cash equivalents of $75.6 million and $15.0 million available to borrow under the Credit Facility. Our liquidity is dependent upon our cash and cash equivalents, cash flows provided by operating activities and the continued availability of borrowings under our Credit Facility. We may need additional capital if our current plans and assumptions change. Our need for additional capital will depend on many factors, including the financial success of our business, the spending required to develop and commercialize new and existing products, the effect of any acquisitions of other businesses, technologies or facilities that we may make or develop in the future, our spending on new market opportunities, and the potential costs for the filing, prosecution, enforcement and defense of patent claims, if necessary.

We believe that based on our current level of operations, our existing cash and cash equivalents will provide adequate funds for ongoing operations, planned capital expenditures and working capital requirements for at least the next 12 months.

However, we may need additional capital if our current plans and assumptions change. Our need for additional capital will depend on many factors, including the financial success of our business, the spending required to develop and commercialize new and existing products, the effect of any acquisitions of other businesses, technologies or facilities that we may make or develop in the future, our spending on new market opportunities, and the potential costs for the filing, prosecution, enforcement and defense of patent claims, if necessary. If our capital resources are insufficient to meet our capital requirements, and we are unable to enter into or maintain collaborations with partners that are able or willing to fund our development efforts or commercialize any products that we develop or enable, we will have to raise additional funds to continue the development of our technology and products and complete the commercialization of products, if any, resulting from our technologies. If future financings involve the issuance of equity securities, our existing stockholders would suffer dilution. If we raise debt financing or enter into credit facilities, we may be subject to restrictive covenants that limit our ability to conduct our business. We may not be able to raise sufficient additional funds on terms that are favorable to us, if at all. If we fail to raise sufficient funds and fail to generate sufficient revenues to achieve planned gross margins and to control operating costs, our ability to fund our operations, take advantage of strategic opportunities, develop products or technologies, or otherwise respond to competitive pressures could be significantly limited. If this happens, we may be forced to delay or terminate research or development programs or the commercialization of products resulting from our technologies, curtail or cease operations or obtain funds through collaborative and licensing arrangements that may require us to relinquish commercial rights, or grant licenses on terms that are not favorable to us. If adequate funds are not available, we will not be able to successfully execute our business plan or continue our business.

Cash Flows

The following table is our statements of cash flows for six months ended June 30, 2020 and 2019:

	Six months ended June 30,	
(In Thousands)	**2020**	**2019**
Net cash used in operating activities	$ (11,498)	$ (7,909)
Net cash used in investing activities	(2,490)	(1,257)
Net cash provided by (used in) financing activities	(903)	49,851
Net increase (decrease) in cash, cash equivalents and restricted cash	$ (14,891)	$ 40,685

Cash Flows from Operating Activities

Cash used in operating activities was $11.5 million net for the six months ended June 30, 2020, which resulted from a net loss of $14.0 million for the six months ended June 30, 2020 adjusted for non-cash charges for depreciation of $0.9 million, ROU lease asset amortization expense of $1.3 million and stock-based compensation of $4.1 million. Additional cash used by changes in operating assets and liabilities was $3.8 million. Changes in operating assets and liabilities included a $2.3 million decrease in unbilled receivables and a $5.0 million decrease in accounts receivables, partially offset by an increase of $3.0 million in deferred revenue and $1.9 million in other accrued liabilities.

Cash used in operating activities was $7.9 million net for the six months ended June 30, 2019, which resulted from a net loss of $11.6 million for the six months ended June 30, 2019 adjusted for non-cash charges for depreciation of $0.7 million, ROU lease asset amortization expense of $1.5 million and stock-based compensation of $4.1 million. Additional cash used by changes in operating assets and liabilities was $2.7 million. Changes in operating assets and liabilities included an increase of $0.9 million in prepaid expenses and other current assets due mainly to stock exercises and a decrease of $1.6 million in accounts payable due to timing of vendor payments.

Cash Flows from Investing Activities

Cash used in investing activities was $2.5 million and $1.3 million for the six months ended June 30, 2020 and 2019, respectively. Cash used in investing activities for the six months ended June 30, 2020 was primarily attributable to the purchase of 1,587,050 shares of MAI's Series A preferred stock for $1.0 million and $1.5 million for purchases of property and equipment. Cash used in investing activities for the six months ended June 30, 2019 was primarily attributable to the purchase of property and equipment.

Cash Flows from Financing Activities

Cash used in financing activities was $0.9 million for the six months ended June 30, 2020 and primarily included taxes paid related to net share settlement of equity awards.

Cash provided by financing activities was $49.9 million for the six months ended June 30, 2019 which included $49.9 million of net proceeds from a private placement in June 2019 and $2.8 million of proceeds from exercises of stock options offset by $2.8 million for taxes paid related to net share settlement of equity awards.

Contractual Obligations

The following table summarizes our significant contractual obligations at June 30, 2020 (in thousands):

	Payments due by period				
(In Thousands)	**Total**	**Less than 1 year**	**1-3 years**	**4-5 years**	**>5 years**
Operating leases obligations [1]	33,333	4,136	8,677	9,455	11,065

[1] Represents future minimum lease payments under non-cancellable operating leases in effect as of June 30, 2020 for our facilities in Redwood City, California. The minimum lease payments above do not include common area maintenance charges or real estate taxes. In February 2019, we have entered into an Eighth Amendment to the Lease (the "Eighth Amendment") with MetLife for our facilities, extending the lease terms from May 2027 to May 2029. For additional information see Note 11, "Commitments and Contingencies" in the Notes to Unaudited Condensed Consolidated Financial Statements.

Other Commitments

We have other commitments related to supply and service arrangements entered into the normal course of business. For additional information about other commitments, see Note 11, "Commitments and Contingencies" in the notes to the unaudited condensed consolidated financial statements. Future minimum payments reflect amounts those obligations are expected to have on our liquidity and cash flows in future periods and include obligations subject to risk of cancellation by us (in thousands):

Other Commitment Agreement Type	**Agreement Date**	**Future Minimum Payment**
(In Thousands)		
Manufacture and supply agreement with expected future payment date of December 2022	April 2016	$ 704
Development and manufacturing services agreements	September 2019	3,785
Strategic collaboration and license agreement	March 2020	364
Total other commitments		$ 4,853

Credit Facility

In June 2017, we entered into a credit facility ("Credit Facility") consisting of term loans ("Term Debt") up to $10.0 million, and advances ("Advances") under a revolving line of credit ("Revolving Line of Credit") up to $5.0 million with an accounts receivable borrowing base of 80% of eligible accounts receivable. At June 30, 2020, we have not drawn from the Credit Facility. We may draw on the Revolving Line of Credit at any time prior to the September 30, 2020 maturity date. On October 1, 2023, loans drawn under the Term Debt mature and the Revolving Line of Credit terminates. Loans made under the Term Debt bear interest through maturity at a variable rate based upon the LIBOR rate plus 3.6%. Advances made under the Revolving Line of Credit bear interest at a variable annual rate equal to the greater of (i) 1.00% above the prime rate and (ii) 5.00%.

Our obligations under the Credit Facility are secured by a lien on substantially all of our personal property other than our intellectual property. The Credit Facility includes a number of customary covenants and restrictive financial covenants including meeting minimum product revenues levels and maintaining certain minimum cash levels with the lender. The Credit Facility's financial covenants restrict the ability of the Company to transfer collateral, incur additional indebtedness, engage in mergers or acquisitions, pay dividends or make other distributions, make investments, create liens, sell assets, or sell certain assets held at foreign subsidiaries. A failure to comply with these covenants could permit the lender to exercise remedies against us and the collateral securing the Credit Facility, including foreclosure of our properties securing the Credit Facilities and our cash. At June 30, 2020, we were in compliance with the covenants for the Credit Facility. For additional information about our credit facility, see Note 11 "Commitments and Contingencies" in the accompanying notes to the unaudited condensed consolidated financial statements.

Off-Balance Sheet Arrangements

As of June 30, 2020, we did not have any off-balance sheet arrangements, as defined in Item 303(a)(4) of Regulation S-K as promulgated by the SEC.

Critical Accounting Policies and Estimates

The preparation financial statements in conformity with generally accepted accounting principles requires management to make judgments, estimates and assumptions in the preparation of our consolidated financial statements and accompanying notes. Actual results could differ from those estimates. There have been no material changes to our critical accounting policies or estimates during the three and six months ended June 30, 2020 from those discussed in our Annual Report on Form 10-K for the year ended December 31, 2019, filed with the SEC on February 28, 2020, except for changes due to adoption of Accounting Standards Update ("ASU") 2016-13, Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments, and ASU No. 2017-04, Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment, which are described below:

Financial Instruments - Credit Losses (Topic 326)

On January 1, 2020, we adopted the provisions of ASU 2016-13, Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments, using a modified retrospective approach. The standard changes the impairment model for most financial assets measured at amortized cost, requiring the use of a "current expected credit loss" model. Under this model, we are required to estimate the lifetime expected credit loss on financial assets, and to record the estimate to an allowance for credit loss. The allowance offsets the amortized cost basis of the financial asset, resulting in a net presentation of the amount expected to be collected on the financial asset or liability.

Financial assets measured at amortized cost

Financial assets measured at amortized cost include loans receivable, debt security assets, trade receivables, net investments in leases, off-balance-sheet credit exposures, reinsurance receivables, contract assets and any other financial assets not excluded from the scope that have the contractual right to receive cash. These assets are not accounted for at fair value through net income.

Current expected credit model

The model requires that credit loss estimates include forecasted information in its formulation. In addition, the model requires recognition of credit loss estimates to be reflected in the financial statements before actual losses are incurred.

Allowance for credit losses

The allowance for credit losses is a valuation account that reflects recognition of losses under the current expected credit loss model. The allowance for credit losses is deducted from the amortized cost basis of financial assets and is presented net on the balance sheet. The net represents the expected to be collected on the financial asset.

Intangibles - Goodwill and Other (Topic 350)

On January 1, 2020, we adopted the provisions of ASU No. 2017-04, "Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment," using a prospective approach. The standard simplifies the accounting for goodwill impairments by eliminating step two from the goodwill impairment test. Goodwill impairment will now be the amount by which a reporting unit's carrying value exceeds its fair value. The adoption of ASU 2017-04 had no impact on our unaudited condensed consolidated financial statements.

ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market Risk Management

Our cash flows and earnings are subject to fluctuations due to changes in foreign currency exchange rates, interest rates and other factors. These market risk exposures are disclosed in Part II, Item 7A of our Annual Report on Form 10-K for the year ended December 31, 2019, filed with the SEC on February 28, 2020.

Interest Rate Sensitivity

In June 2017, we entered into a credit facility consisting of term loans up to $10.0 million, and advances under a revolving line of credit up to $5.0 million. Draws on the term debt bear interest through maturity at a variable rate based upon the LIBOR rate plus 3.6%. Advances made under the revolving line of credit bear interest at a variable annual rate equal to the greater of (i) 1.00% above the prime rate and (ii) 5.00%. Increases in these variable interest rates will increase our future interest expense and decrease our results of operations and cash flows. No amounts were drawn down under the credit facility as of June 30, 2020. Our exposure to interest rates risk relates to our 2017 Credit Facility with variable interest rates, where an increase in interest rates may result in higher borrowing costs. Since we have no outstanding borrowings under our 2017 Credit Facility as of June 30, 2020, the effect of a hypothetical 10% change in interest rates would not have any impact on our interest expense.

Foreign Currency Risk

Our results of operations and cash flows are subject to fluctuations due to changes in foreign currency exchange rates. In periods when the United States dollar declines in value as compared to the foreign currencies in which we incur expenses, our foreign-currency based expenses increase when translated into United States dollars. Although substantially all of our sales are denominated in United States dollars, future fluctuations in the value of the United States dollar may affect the price competitiveness of our products outside the United States. Our most significant foreign currency exposure is due to non-functional currency denominated monetary assets, primarily currencies denominated in other than their functional currency. These non-functional currency denominated monetary assets are subject to re-measurement which may create fluctuations in other expense, net, a component in our consolidated statement of operations and in the fair value of the assets in the consolidated balance sheet. As of June 30, 2020, the effect of a hypothetical 10% unfavorable change in exchange rates on currencies denominated in other than their functional currency would result in a potential loss in future earnings in our consolidated statement of operations and a reduction in the fair value of the assets of approximately $0.1 million. We did not engage in hedging transactions in 2020 or 2019.

Investment in Equity Securities

We own an equity investment in Molecular Assemblies, Inc. (“MAI”) which is a privately held company. Concurrently with our initial equity investment, John Nicols, our chief executive officer, joined MAI’s board of directors, and we entered into the MAI Agreement pursuant to which we will provide technical services and expertise in exchange for compensation in the form of additional shares of voting preferred stock. We and MAI envision entering into an arrangement to commercialize products developed under the MAI Agreement.

To analyze the fair value measurement of our equity investment in MAI, we perform a qualitative analysis using significant unobservable inputs. Significant changes to the unobservable inputs may result in a significantly higher or lower fair value estimate. We may value our equity investment based on significant recent arms-length equity transactions with sophisticated non-strategic unrelated new investors, providing the terms of these equity transactions are substantially similar to the equity transactions terms between the company and us. The impact of the difference in transaction terms on the market value of the portfolio company may be difficult or impossible to quantify.

ITEM 4. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures and internal controls that are designed to provide reasonable assurance that information required to be disclosed in our Exchange Act reports 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 principal executive officer and our principal financial and accounting officer, as appropriate, to allow timely decisions regarding required disclosure.

Our management, including our principal executive officer and our principal financial and accounting officer, evaluated the effectiveness of our disclosure controls and procedures as defined by Rules 13a-15(e) and 15d-15(e) of the Exchange Act. Based on this review, our principal executive officer and our principal financial and accounting officer concluded that these disclosure controls and procedures were effective as of June 30, 2020 at the reasonable assurance level.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting identified in connection with the evaluation required by paragraph (d) of Exchange Act Rules 13a-15 or 15d-15 that occurred during our last fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. Because of the impact of COVID-19 shelter-in-place orders, we have made minor modifications to existing controls involving evidence of review-type controls. Further, we implemented internal controls to ensure we adequately evaluated impairment of financial instruments and goodwill, respectively, in properly assessing and facilitating the impact and adoption on January 1, 2020 of ASU 2016-13, Financial Instruments - Credit Losses (Topic 326) and ASU No. 2017-04, Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. There were no significant changes to our internal control over financial reporting due to the adoption of new standards.

Inherent Limitations on Effectiveness of Controls

In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, even if determined effective and no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives to prevent or detect misstatements. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

PART II. OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

We are not currently a party to any material pending litigation or other material legal proceedings.

ITEM 1A. RISK FACTORS

We have included in Part I, Item 1A of our Annual Report on Form 10-K for the year ended December 31, 2019, a description of certain risks and uncertainties that could affect our business, future performance or financial condition (the "Risk Factors"). During the three months ended June 30, 2020, there were no material changes from the disclosure provided in the Form 10-K for the year ended December 31, 2019 with respect to the Risk Factors, except as set forth below. Investors should consider the Risk Factors prior to making an investment decision with respect to our stock.

The ongoing COVID-19 pandemic has and may continue in the future to, directly or indirectly, adversely affect our business, results of operations and financial condition.

In the United States, the impact of COVID-19, including compliance with governmental orders governing the operation of businesses during the pandemic, caused the temporary closure of our Redwood City, California facilities and disrupted our research and development operations. We believe that these disruptions likely had a negative impact on revenue during the three-month period ending June 30, 2020. In the future, our business could be materially adversely affected, directly or indirectly, by the widespread outbreak of contagious disease, including the ongoing COVID-19 pandemic. National, state and local governments in affected regions have implemented and may continue to implement safety precautions, including quarantines, border closures, increased border controls, travel restrictions, governmental orders and shutdowns, business closures, cancellations of public gatherings and other measures. Organizations and individuals are taking additional steps to avoid or reduce infection, including limiting travel and staying home from work. These measures are disrupting normal business operations both in and outside of affected areas and have had significant negative impacts on businesses and financial markets worldwide.

The potential impact and duration of COVID-19 or another pandemic or public health crisis could have significant repercussions across regional, national and global economies and financial markets, and could trigger a period of regional, national and global economic slowdown or regional, national or global recessions. The outbreak of COVID-19 in many countries continues to adversely impact regional, national and global economic activity and has contributed to significant volatility and negative pressure in financial markets. As a result, we may experience difficulty accessing debt and equity capital on attractive terms, or at all, due to the severe disruption and instability in the global financial markets. In addition, our customers may terminate or amend their agreements for the purchase of our products or services due to bankruptcy, lack of liquidity, lack of funding, operational failures, or other reasons.

We continue to monitor our operations and applicable government recommendations, and we have made modifications to our normal operations because of the COVID-19 pandemic, including requiring most office-based employees to work remotely. Notwithstanding these measures, the COVID-19 pandemic could affect the health and availability of our workforce as well as those of the third parties we rely on taking similar measures. If members of our management and other key personnel in critical functions across our organization are unable to perform their duties or have limited availability due to COVID-19, we may not be able to execute on our business strategy and/or our operations may be negatively impacted. We may also experience limitations in employee resources, including because of sickness of employees or their families or the desire of employees to avoid contact with individuals or large groups of people. In addition, we have experienced and will continue to experience disruptions to our business operations resulting from quarantines, self-isolations and other restrictions on the ability of our employees to perform their jobs.

The COVID-19 pandemic has disrupted business operations. The extent and severity of the impact on our business and clinical trials will be determined largely by the extent of disruptions in the supply chains for our products and product candidates; disruptions in access by patients to therapies for which our products are components of the supply chain; delays in the performance of R&D service work, and delays in current and future clinical trials that we or our collaboration partners conduct. In addition, the impact of the COVID-19 pandemic on the operations of the FDA and other health authorities may delay potential approvals of product candidates for which our products are components of the supply chain.

While it is not possible at this time to estimate the entirety of the impact that the COVID-19 pandemic will have on our business, operations, employees, customers, suppliers or our collaboration partners, continued spread of COVID-19, measures taken by governments, actions taken to protect employees and the broad impact of the pandemic on all business activities may materially and adversely affect our business, results of operations and financial condition. As a result, we have withdrawn our full year 2020 financial guidance.

ITEM 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS

None.

ITEM 3. DEFAULTS UPON SENIOR SECURITIES

None.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

ITEM 5. OTHER INFORMATION

Not applicable.

ITEM 6. EXHIBITS

3.1	Amended and Restated Certificate of Incorporation of Codexis, Inc. filed with the Secretary of the State of the State of Delaware on April 27, 2010 and effective as of April 27, 2010 (incorporated by reference to Exhibit 3.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2010, filed on May 28, 2010).
3.2	Certificate of Designations of Series A Junior Participating Preferred Stock of Codexis, Inc., filed with the Secretary of State of the State of Delaware on September 4, 2012 (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, filed on September 4, 2012).
3.3	Amended and Restated Bylaws of Codexis, Inc. effective as of April 27, 2010 (incorporated by reference to Exhibit 3.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2010, filed on May 28, 2010).
4.1	Reference is made to Exhibits 3.1 through 3.3.
31.1	Certification of Principal Executive Officer Required Under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended.
31.2	Certification of Principal Financial Officer Required Under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended.
32.1	Certification of Principal Executive Officer and Principal Financial Officer Required Under Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended, and 18 U.S.C. §1350.
101	The following materials from the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2020, formatted in Inline Extensible Business Reporting Language (iXBRL) includes: (i) Unaudited Condensed Consolidated Balance Sheets at June 30, 2020 and December 31, 2019, (ii) Unaudited Condensed Consolidated Statements of Operations for the Three and Six Months Ended June 30, 2020 and 2019, (iii) Unaudited Condensed Consolidated Statements of Stockholders' Equity for the Three and Six Months Ended June 30, 2020 and 2019, (iv) Unaudited Condensed Consolidated Statements of Cash Flows for the Six Months Ended June 30, 2020 and 2019 and (v) Notes to Unaudited Condensed Consolidated Financial Statements.
101.SCH	Inline XBRL Taxonomy Extension Schema Document
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document
104	The cover page from the Company’s Quarterly Report on Form 10-Q for the quarter ended June 30, 2020, formatted in Inline XBRL and contained in Exhibit 101.

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.

Codexis, Inc.

Date: August 7, 2020

By: /s/ John J. Nicols

John J. Nicols
President and Chief Executive Officer
(principal executive officer)

Date: August 7, 2020

By: /s/ Ross Taylor

Ross Taylor
Senior Vice President and Chief Financial Officer
(principal financial and accounting officer)

Exhibit 31.1

CERTIFICATION

I, John J. Nicols, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Codexis, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: August 7, 2020

/s/ John J. Nicols

John J. Nicols

President and Chief Executive Officer
(principal executive officer)

Exhibit 31.2

CERTIFICATION

I, Ross Taylor, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Codexis, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: August 7, 2020

/s/ Ross Taylor

Ross Taylor
Senior Vice President and Chief Financial Officer
(principal financial and accounting officer)

Exhibit 32.1

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

In connection with the Quarterly Report of Codexis, Inc. (the "Company") on Form 10-Q for the fiscal quarter ended June 30, 2020, as filed with the Securities and Exchange Commission (the "Report"), John J. Nicols, President and Chief Executive Officer of the Company and Ross Taylor, Senior Vice President and Chief Financial Officer of the Company, respectively, do each hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

- The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- The information in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: August 7, 2020

/s/ John J. Nicols

John J. Nicols
President and Chief Executive Officer
(principal executive officer)

/s/ Ross Taylor

Ross Taylor
Senior Vice President and Chief Financial Officer
(principal financial and accounting officer)